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ROCKY FLATS

Site-Specific Health & Safety Plan Addendum, OU7

August 1994

DOCUMENT CLASSIFICATION REVIEW WAIVER PER CLASSIFICATION OFFICE

Site-Specific Health and Safety Plan Addendum

Implementation of Phase II RFI/RI
Rocky Flats Plant, Operable Unit No. 7

Final

August 17, 1994

This is an addendum to the EG&G approved Site-Specific Health and Safety Plan: Implementation of Phase I RFI/RI Work Plan, Rocky Flats Plant, Operable Unit 7

HEALTH AND SAFETY PLAN

REVIEW AND APPROVAL

The following signatures document that this Project Health and Safety Plan (HASP) has been reviewed and approved by appropriate Departments and the applicable federal, state, and local regulations and RFP policies and practices have been incorporated.

Health and Safety Plan Title

Addendum to Site-Specific Health and Safety Plan, Implementation of Phase II RFI/RI Rocky Flats Plant, Operable Unit 7

This site specific health and safety plan has been written for the use of The S. M. Stoller Corporation, its employees and subcontractors. All EG&G personnel associated with this Project will comply with RFP applicable aspects of the plan.

REVIEW AND APPROVAL

6/22/94

EG&G Project Manager — Date

Health and Safety Liaison Officer — Date

6/21/94

Environmental Restoration Health and Safety Officer — Date

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EG&G Project Manager Date

Health and Safety Liaison Officer Date 6-21-94

Environmental Restoration Health and Safety Officer Date

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SITE SPECIFIC HEALTH & SAFETY PLAN ADDENDUM - OU7

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1. INTRODUCTION

The S.M. Stoller Corporation (Stoller) prepared this health and safety plan (HASP) addendum to the EG&G-approved Site-Specific Health and Safety Plan: Implementation of Phase I RFI/RI Work Plan, Operable Unit 7 (SSHSP-OU 7), dated October 26, 1992 (Appendix A). The site-specific health and safety procedures and policies from SSHSP-OU 7 apply to this addendum. This includes sections on Hazard Assessments, Hazard Communication, Site Control, Personal Protective Equipment, Decontamination, Medical Surveillance, Monitoring, Training, and Emergency Information.

1.1 Purpose and Policy

This plan outlines the health and safety protocol to be followed during the Phase II Resource Conservation and Recovery Act (RCRA) facility investigation/remedial investigation (RFI/RI) carried out at Operable Unit (OU) No. 7. The Phase II RFI/RI activities will further characterize groundwater in the vicinity of OU 7 and surface soils around the East Landfill Pond and evaluate the design of the landfill cap. Activities to be performed during the Phase II RFI/RI are similar to activities performed during the Phase I RFI/RI and include collection of soil samples, borehole drilling, well installation, and groundwater sampling. One significant difference between Phase I and Phase II activities is that no borehole drilling will be performed within Individual Hazardous Substance Site (IHSS) 114 (the Present Landfill) or other IHSSs during the Phase II RFI/RI.

This HASP addendum establishes personnel protection standards and mandatory safety practices and procedures for the work proposed within the project area. This HASP addendum also provides for alternate procedures to address changing situations that may arise during drilling and other field operations. This HASP addendum applies to all personnel working on this project. Stoller personnel and other site participants will adhere to this HASP addendum, the SSHSP-OU 7, and any other applicable EG&G health and safety requirements or policies.

1.2 General Site Information

- PROJECT NAME: Phase II RFI/RI of OU 7
- SITE NAME: Rocky Flats Site
- SITE LOCATION: Golden, CO
- DURATION OF PHASE II PROJECT: Approximately 4 months
- OVERALL HAZARD: High___ Medium _X_ Low _____

1.3 Summary of Field Activities

The OU 7 Phase II RFI/RI will entail soil sampling, borehole drilling, monitoring well installation, drawdown recovery tests at monitoring wells, and groundwater sampling. Soil samples will be collected from two distinct depth intervals, 0 to 2 inches and 0 to 10 inches. The samples will be collected from locations around the East Landfill Pond. Soil samples will also be collected from the 0 to 2 inch interval within IHSS 114. Boreholes will be drilled at eight locations in the vicinity of the East Landfill Pond and along No Name Gulch east of OU 7 to provide information for the design of monitoring wells at these locations. Eight additional holes will be drilled, one at each location, for the installation of monitoring wells. The monitoring wells will be used for drawdown-recovery tests and groundwater sampling.

Additional details for Phase II field activities are presented in the Sampling and Analysis Plan in the draft Technical Memorandum, Revised Work Plan, Operable Unit No. 7—Present Landfill (IHSS 114) and Inactive Hazardous Waste Storage Area (IHSS 203) (DOE 1994).

2. PROJECT ORGANIZATION

The OU 7 Phase II RFI/RI is being conducted by Stoller for EG&G Rocky Flats, Inc. Stoller is responsible for implementing the Revised Work Plan for OU 7 (DOE 1994) in coordination with EG&G project managers, contract administrators, and onsite personnel. Responsibilities of primary individuals are covered in Section 2.0 of the SSHSP-OU 7. An organizational chart and responsibilities of project-specific personnel are incorporated in this section.

2.1 EG&G Site Contacts

The following personnel are critical to the planned activities of the Phase II RFI/RI at OU 7.

Contact	Phone Number	Job Title
Laurie Peterson-Wright (EG&G)	966-8553	Contract Technical Representative (CTR)
Wendy Bartholomew (EG&G)	966-8512	Subcontract Administrator (SA)
Peter Martin (EG&G)	966-8695	Assistant CTR
Keith Anderson (EG&G)	966-6979	Environmental Restoration Health and Safety Officer
Lisa Nelowet (EG&G)	966-5471	Health and Safety Liaison Officer
Larry Erwin (Ogden)	843-6210	Health and Safety Specialist (HSS)

2.2 Project Team Organization and Personnel Responsibilities

The OU 7 project team is organized into two parts: project management and the field team. Personnel assigned to each position of the project team and their corresponding responsibilities are detailed below.

2.2.1 *Project Management*

The project management staff consists of the personnel necessary to control the day-to-day technical, administrative, and contractual operations of the OU 7 project. Figure 1 shows the field team organization. Duties and responsibilities of the project management staff are outlined below.

Program Manager — Allen Crockett

The program manager ensures that Stoller completes the proposed scope of work according to EG&G/DOE and contract requirements, including quality of work and compliance with budget and schedule requirements. This individual provides strategic direction during the project, oversees work and deliverables, and ensures that the Stoller peer review and quality assurance (QA)/quality control (QC) functions are conducted. The program manager also maintains communications with EG&G's project sponsor to ensure that the objectives of the project, as specified by the terms of the contract, are met to EG&G's satisfaction.

Quality Assurance Manager — Anton Camarota

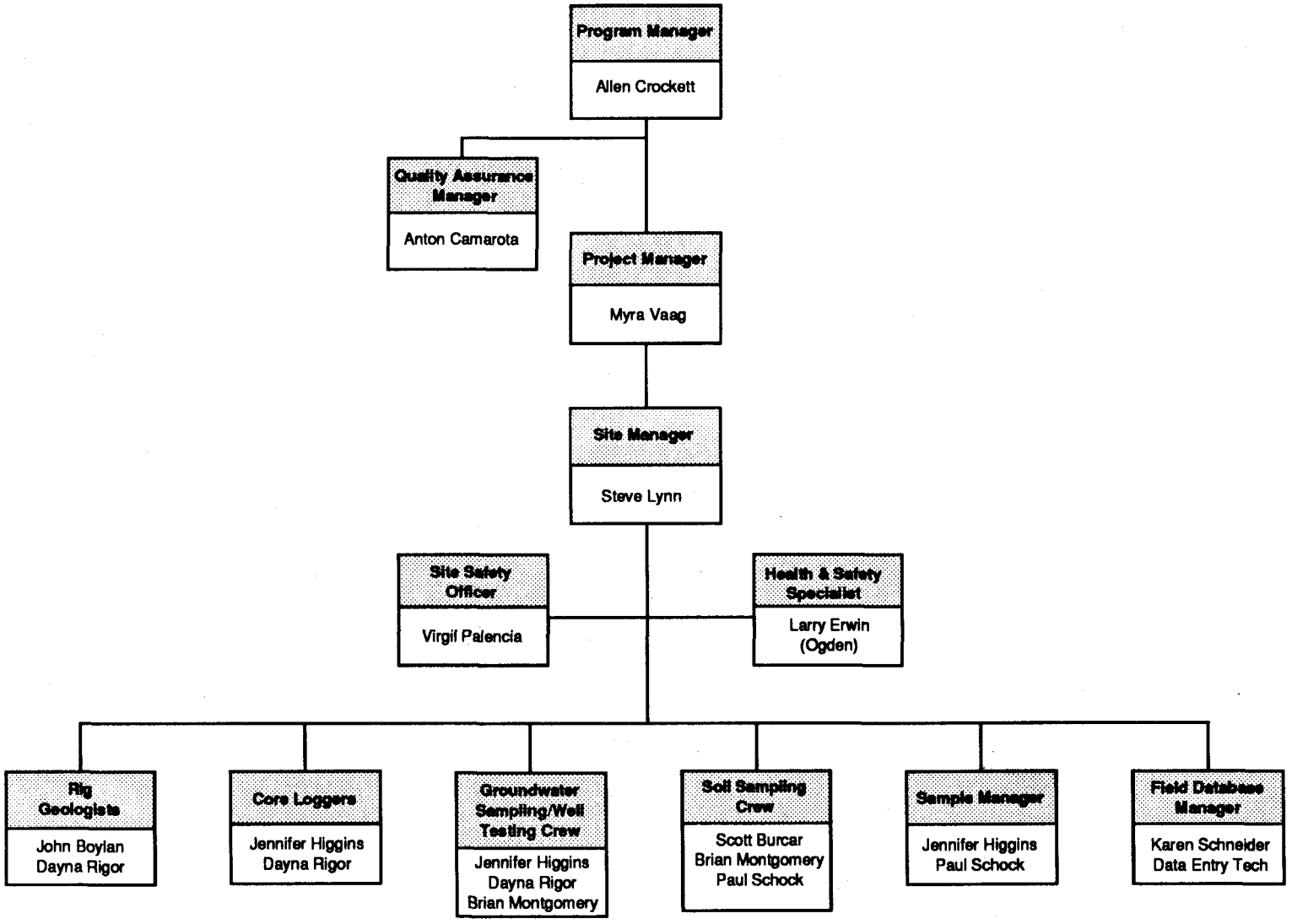
The project QA manager serves as a consultant to the program manager and oversees and evaluates QA activities for this project.

Project Manager — Myra Vaag

The project manager completes the proposed scope of work according to EG&G/DOE and contract requirements. This includes overseeing project task managers, quality assurance officer, work quality, and compliance with budget and schedule requirements. Additional specific responsibilities include:

- Technical direction and control of Stoller staff in accordance with contract requirements;
- Communications with EG&G concerning management issues, including contract negotiation, contract requirements, and contract modifications (if required);
- Communications with EG&G and Stoller concerning technical issues;
- Classification review;

Figure 1 OU 7 Field Team Organization



M:\ES\OU7 RFI/RI Project organization\7-5-94

- Document control and preparation of administrative deliverables;
- Communication with EG&G concerning work progress and findings, cost, and schedule issues;
- Cost control; and
- Incorporation of QA activities.

The project manager is the liaison between the project manager and the field team and oversees technical implementation of the sampling and analysis plan. The project manager will also coordinate the preparation of reports for the baseline risk assessment and the IM/IRA.

The project manager oversees the preparation of monthly invoices and supporting documentation as well as accounts payable and works with contracting personnel to administer contracts with subcontractors and with EG&G. The project manager will also provide monthly cost/schedule progress reports that briefly summarize progress for the reporting period and identify planned work for the next reporting period. As required by the Statement of Work, monthly update reports that summarize significant issues or problems that arise during the reporting period and suggest solutions will be prepared.

Stoller technical and administrative staff support the project manager as necessary.

2.2.2 Field Team

The Stoller field team comprises the following functional positions and individuals.

- Project Manager — Myra Vaag
- Site Manager — Steve Lynn
- Assistant Site Manager — Jennifer Higgins
- Site Safety Officer (SSO) — Virgil Palencia
- Health and Safety Specialist (HSS) — Larry Erwin (Ogden)
- Rig Geologists — John Boylan, Dayna Rigor
- Core Loggers — Dayna Rigor, Jennifer Higgins
- Sample Manager — Michelle Hanson
- Field Database Manager — Karen Schneider
- Soil Sampling Crew — Michelle Hanson, Karen Schneider, Brian Montgomery
- Well Testing and Groundwater Sampling Crew — Jennifer Higgins, Michelle Hanson, Paul Schock
- Drilling Subcontractor — Driller, driller's helper, and support laborer (Christensen Boyles Corporation)
- Surveying Subcontractor — Merrick and Company

Depending on other Stoller staffing requirements, some substitutions with equally qualified personnel could be made. The responsibilities and duties of the key functional positions are described below.

Site Manager

The site manager has the primary and ultimate responsibility for all field team activities. The site manager will:

- Brief the rig geologists and/or other field crew leaders daily prior to fieldwork;
- Meet with the SSO daily and ensure that safety and equipment requirements are met;
- Generate weekly progress reports, including information regarding number of boreholes or wells completed, number of soil samples collected, results of field screening of samples, problems encountered, and solutions;
- Interact with the EG&G project manager daily;
- Interact with the Stoller project manager daily;
- Coordinate appropriate agencies and subcontractors;
- Check project data sheets prior to submittal to the Stoller project manager;
- Initiate document modification requests when it is necessary to deviate from the project control documents;
- Post applicable document modification requests, and inform personnel of pertinent changes;
- Maintain a daily log of all personnel and visitors who enter and exit field areas;
- Maintain a log of daily activities, including logs of telephone conversations; and
- Ensure punctual and correct completion of daily paperwork (standard operating procedure [SOP] forms) by all field personnel.
- Maintain equipment;
- Inventory and order supplies;
- Complete purchase requisitions, and maintain procurement files;
- Interact with Stoller office procurement personnel;

- Inspect procured equipment, and maintain invoice files for equipment received;
- Assist with other direct cost (ODC) tracking;
- Maintain project field files;
- Maintain a log of field books, and perform QC checks of field books;
- Perform QC checks of completed SOP forms;
- Ensure completion of all phases of the QA/QC program; and
- Interact with the data manager on a daily basis to ensure proper completion of data entry activities and QA/QC.

Site Safety Officer

The SSO is responsible for the overall safety of the field team. The SSO will perform the following duties and responsibilities:

- Maintain files documenting personnel training qualifications including
  - Respirator fit tests,
  - Medical monitoring documentation,
  - Radiological training documentation, and
  - OSHA training documentation.
- Conduct site-specific health and safety briefing for all field personnel and for site visitors.
- Ensure that all field personnel and all site visitors have read and understand the project health and safety plan.
- Monitor each member of the field team for compliance with the project-specific health and safety plan and for other health and safety needs, and document this information.
- Maintain files of material safety data sheets (MSDSs).
- Conduct daily health and safety briefing for all field personnel to discuss work status and any health and safety issues (such as weather, level of protection, etc.).

- Initiate appropriate revisions to the health and safety plan in response to changing conditions at OU 7.

- Oversee and coordinate activities with the health and safety specialist.

- Check specifications, coordinate maintenance, and ensure daily/regular calibration of health and safety equipment.

- Confirm calibrations of monitoring equipment and log results.

- In the absence of the health and safety specialist, fill out appropriate SOP forms, including

  - Field Monitoring Results of Cuttings or Core (Form FO.8A),
  - Verification of Organic Vapor Monitoring Results (Form FO.8B),
  - Record of Drilling Fluids and Cuttings (Form FO.8C),
  - Calibration Record (Form FO.15A),
  - Results of Radiological Measurements in the Field (Forms FO.16A, FO.16B),
  - Contamination Survey Forms (Form EMRG 1.1A, 1.1B, 3.1A, 6.6A, as appropriate),
  - Daily Source Check Log (Form OPS 6.1A, 6.1B, 6.1C, as appropriate), and
  - Performance Test Log Sheet (Form OPS 6.3A, 6.3B, 6.3C, 6.4A, 6.4B, as appropriate).

- Monitor field conditions (such as temperature, wind, and lightning).

- Set up an exclusion zone with cones (high-visibility, 30-foot radius from borehole).

- Monitor samples, equipment, and personnel for organics according to the applicable SOPs.

- Observe/monitor the crew for health and safety needs (such as health and safety infractions and heat stress).

- Implement emergency procedures as required.

- Authorize the suspension of field activities if the health and safety of personnel are endangered.

- Maintain a daily log of onsite health and safety information, including a daily health and safety checklist, and document health and safety information, including instrument readings, significant events, and observations.

- Authorize the temporary suspension of an individual from field activities for infractions of the health and safety plan.

- Initiate the appropriate paperwork for health and safety incidents and infractions.

Health and Safety Specialist

The health and safety specialist will:

- Perform SSO's duties in his or her absence;

- Calibrate, source check, and maintain all radiation instrumentation, and complete appropriate SOP forms, including

  - Calibration Record (Form FO1.15A),
  - Contamination Survey Forms (Form EMRG 1.1A, 1.1B, 3.1A, 6.6A, as appropriate),
  - Daily Source Check Log (Form EMRG 6.1A, 6.1B, 6.1C, as appropriate), and
  - Performance Test Log Sheet (Form EMRG 6.3A, 6.3B, 6.3C, 6.4A, 6.4B, as appropriate);

- Obtain radiological work permits and post radiation signage as necessary;

- Complete appropriate SOP forms, including

  - Field Monitoring Results of Cuttings or Core (Form FO.8A),
  - Verification of Organic Vapor Monitoring Results (Form FO.8B),
  - Record of Drilling Fluids and Cuttings (Form FO.8C), and
  - Results of Radiological Measurements in the Field (Forms FO.16A, FO.16B);

- Implement and enforce the Environmental Management Radiological Guidelines (EMRGs);

- Monitor samples, equipment, and personnel for radionuclides according to the applicable SOPs and EMRGs;

- Verify all radiation readings that are greater than 250 counts per minute (cpm) on equipment or personnel using the verification procedures described in FO.08 (Section 6.3.1);

- Perform daily, weekly, and monthly radiation surveys of equipment and work areas as needed;

- Screen project equipment after exiting the main decontamination facility (MDF);

- Perform equipment release surveys;
- Document all radiation surveys;
- Scale and count all radiological smears collected in the field; and
- Conduct daily QA checks of all field radiation monitoring documentation.

Sample Manager

The sample manager will:

- Meet with the site manager daily to obtain sampling requirements, including QA/QC requirements;
- Complete appropriate SOP forms, including the Residual Lab Soil Characterization Form (Form FO.9A);
- Complete the chain-of-custody (COC) forms;
- Decontaminate sample coolers;
- Prepare decontaminated sample coolers with the appropriate sample liners, sample containers, and blue ice prior to daily field activities;
- Meet and coordinate daily activities with the data manager;
- Assist the data manager in maintaining a sample tracking database;
- Maintain a daily log of sample-management activities;
- Record dates, times, and pertinent data of important telephone conversations with laboratories or EG&G personnel about sample information;
- Ensure that samples shipped offsite meet Department of Transportation (DOT) requirements;
- Secure and preserve collected samples until shipment;

- Check sample labels to make sure they contain the proper information and that they are consistent with the corresponding COC;

- Properly package sample jars and containers that will be shipped to the laboratory;

- Properly label the sample coolers according to environmental sampling requirements prior to lab shipment;

- Deliver sample coolers to the courier;

- Interact with the laboratory, including

  – Notifying the lab of samples being shipped,
  – Verifying arrival of samples and that holding times are met, and
  – Conducting sample tracking;

- Inventory sampling equipment and supplies (including sample containers, labels, blue ice, coolers, etc.), and order as necessary through the assistant site manager; and

- Provide weekly synopsis to site supervisor of samples shipped during the previous week and projected number of samples to be shipped during the upcoming week.

Database Manager

The database manager will:

- Fill out or enter data from appropriate SOP forms, including Rocky Flats Environmental Database System (RFEDS) Field Data Transmittal Form (Form FO.14A);

- Enter field data and sample-tracking information from field forms into Datacap;

- Ensure that QC of the RFEDS information entered is conducted;

- Print hard copies of Datacap file;

- Backup information on diskette and tape daily;

- Download Datacap files, and transmit to EG&G weekly;

- Enter boring logs into Geobase borehole program;
- Ensure that QC of the Geobase information entered is conducted;
- Print hard copies of Geobase;
- Download Geobase files to EG&G;
- Provide daily tracking of waste generated during field operations; and
- Download waste tracking information.

Rig Geologist

The rig geologist is responsible for the overall operation of the field team for drilling operations. The rig geologist will:

- Meet with the site manager daily to discuss activities;
- Meet with the driller daily for briefing on the proposed work load;
- Meet with the sample manager daily to obtain information on the sampling and QA/QC requirements;
- Ensure that the driller and helper load appropriate equipment such as drums, decontaminated and appropriately sized downhill equipment, and decontaminated and appropriately sized well materials (such as pipe, filter pack, bentonite pellets, grout, sand bailer, surface casing);
- Confirm that all downhill equipment has been properly decontaminated prior to drilling;
- Document pertinent information, including site visitors, significant events, observations, and measurements during field investigations;
- Ensure that all drilling activities are conducted according to the applicable SOPs and work plan;
- Verify that wells are installed according to the applicable SOPs and work plan;

- Verify that a well (if installed) is properly labeled and locked with an EG&G-provided lock prior to leaving the well site;

- Relinquish samples to the sample manager at the end of the day;

- Complete appropriate SOP forms, including

  - Preliminary Well-Site Field Log (Form GT.1B),
  - Daily Field Drilling Activities Report (Form GT.2A),
  - Well/Borehole Abandonment Form (Form GT.5A),
  - Groundwater Monitoring Well and Piezometer Report (Form GT.6A),
  - Equipment Decontamination/Wash Checklist and Record (Form FO.3A),
  - Heavy Equipment Decontamination/Wash Checklist and Record (Form FO.4A),
  - Drum Field Log Form (Form FO.10A),
  - Drum Inspection Form (Form FO.10B),
  - Soil and Sediment IDM Form (Form FO.23A), and
  - RCRA Final Drum Disposition Form (Form FO.23B);

- Assign personnel to drum receiving, handling, and labeling;

- Coordinate with EG&G concerning transfer and storage of drums and maintaining waste documents; and

- Maintain a drum tracking database.

Core Logger

The core logger will:

- Log soil and bedrock core in accordance with SOP GT.1, Logging Alluvial and Bedrock Material;

- Complete appropriate SOP forms, including the Borehole Log (Form GT.1A);

- Interact with the stratigrapher from EG&G Geosciences;

- Maintain a file on borehole logs and monitoring well completion forms;

- Follow Rocky Flats requirements regarding photographing core; and

- Maintain the storage area for core.

Soil Sampling Crew

The soil samplers will:

- Meet with the site supervisor daily to discuss sampling activities;
- Ensure that sampling activities are completed in accordance with the applicable SOPs and work plan;
- Complete the appropriate SOP forms; and
- Perform sample manager's duties in his or her absence.

Groundwater Sampling and Well Testing Crew

The samplers will:

- Meet with the site supervisor daily to discuss sampling and testing activities;
- Ensure that sampling activities are completed in accordance with the applicable SOPs and work plan;
- Complete the appropriate SOP forms; and
- Perform sample manager's duties in his or her absence.

3. ROCKY FLATS SITE BACKGROUND

This section briefly discusses the history of Rocky Flats site and describes OU 7. Additional background information is provided in the draft Technical Memorandum, Revised Work Plan, Operable Unit No. 7—Present Landfill (IHSS 114) and Inactive Hazardous Waste Storage Area (IHSS 203) (DOE 1994).

3.1 Site History

The Rocky Flats site is a government-owned contractor-operated facility. EG&G is the primary operating contractor. Until January 1992, Rocky Flats was operated as a nuclear weapons research, development, and production plant. Nuclear weapon components were fabricated from plutonium, uranium, beryllium, and stainless steel. Parts made at the plant were shipped elsewhere for assembly. Support activities conducted at the plant included chemical recovery and purification of recyclable transuranic radionuclides and research and development in metallurgy, machining, nondestructive testing, coatings, remote engineering, chemistry, and physics (Rockwell International 1987). Wastes resulting from plant activities include hazardous wastes, low-level (LL) and transuranic (TRU) radioactive wastes, and mixed wastes. Historically, these wastes were either disposed onsite, stored in containers onsite, or disposed offsite.

The Rocky Flats site was proposed for inclusion on the Superfund National Priority List (NPL) in 1984 and was included on the NPL in the October 4, 1989 *Federal Register*. Cleanup is being conducted under RCRA and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy (DOE), and the Colorado Department of Health (CDH) are involved in assessment and cleanup roles at the plant. The Federal Facility Agreement and Consent Order (Interagency Agreement) among EPA, CDH, and DOE was finalized in January 1991 and was produced to clarify the roles and responsibilities of each agency (DOE 1991). Rocky Flats is currently in a "mission transition" phase to an environmental restoration (ER) site.

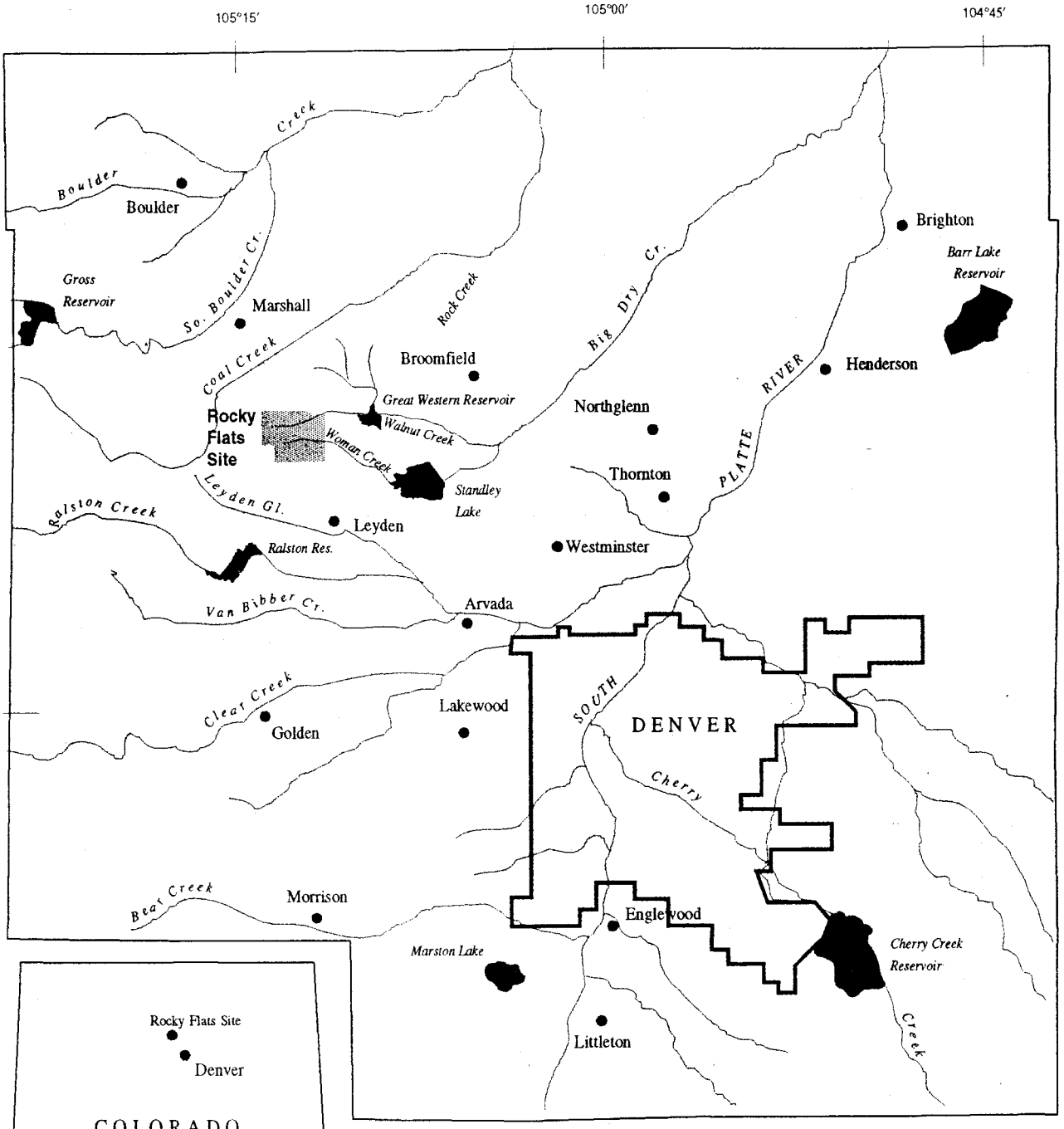
3.2 Site Description

Rocky Flats site covers approximately 6,550 acres in Jefferson County, Colorado, Sections 1 through 4 and 9 through 15 of R70W, T2S (Figure 2). The facility is centered at 105 degrees 11' 30" west longitude, 39 degrees 53' 30" north latitude. This location is 16 miles northwest of Denver and 9 to 12 miles from the communities of Boulder, Broomfield, Golden, and Arvada. It is approximately bounded on the north by State Highway 128, on the west by State Highway 93, on the south by State Highway 72, and on the east by Jefferson County Highway 17 (Indiana Street).

Major plant structures, including all production buildings, are located within a 384-acre security-fenced area. The site is divided into several areas constituting separate operational complexes. The major production and associated complexes are in the 300, 400, 600, 700, 800, and 900 areas.

3.3 Operable Unit Site Description

OU 7 comprises the Present Landfill (IHSS 114); the Inactive Hazardous Waste Storage Area (IHSS 203); and the East Landfill Pond and adjacent spray evaporation areas. OU 7, which is located north of the plant complex on the western end of No Name Gulch, encompasses approximately 44 acres. The Present Landfill is operational until the proposed date of closure in 1997. IHSS 203 is located at the southwest corner of the Present Landfill. This area was formerly a storage area for drummed liquid and solid wastes. The spray evaporation of water from the East Landfill Pond covered the north and south embankments of the pond.



EG&G ROCKY FLATS
Rocky Flats Site, Golden, Colorado

Location of Rocky Flats Site

Health and Safety Plan Addendum

Operable Unit No. 7

Date: July 1994

Figure 2

M:ES:RFP & Vicinity Map.ill:7-4-94

4. HAZARD ASSESSMENT

Potentially hazardous materials may be encountered during intrusive activities; however, potential worker exposures to these materials are expected to be minimal. This conclusion is drawn from previous air sampling results obtained during the OU 7 Phase I RFI/RI. Air samples were collected during drilling and soil sampling operations for chemical, heavy metal, particulate, and radiological inhalation hazards. The laboratory results showed insignificant concentrations of any of the target analytes (EG&G 1993).

Workers shall employ dust control measures during the RFI/RI, and chemical and radiological monitoring shall be used to recognize hazardous materials and potential existence of explosive atmospheres. Appropriate personal protective equipment (PPE) shall be used to prevent contact with materials and equipment that may have surface contaminants.

Safety risks encountered during drilling activities include the potential for trips and falls, and injuries associated with the use of drilling equipment. General Occupational Safety and Health Act (OSHA) drilling safety practices shall be followed during all phases of work on this project to protect the workers from these hazards.

4.1 Hazardous Materials Summary

The potential for encountering chemical and radiological hazards is dependent on site-specific activities. The following section offers a summary of potential hazards of concern during the Phase II RFI/RI at OU 7.

Material Type(s):

Liquid	X
Solid	X (soils)
Sludge	
Gas	X
Other	

Characteristics:

Corrosive	____
Ignitable	X
Radioactive	X
Volatile	X
Toxic	X
Reactive	____
Unknown	X (site not completely characterized)

Hazards of Concern:

Organic chemicals	X
Inorganic chemicals	X
LL waste	X
TRU waste	X
Biologic	X
Slip, trip, fall	X
Drowning	____
Weather	X
Plant operations	____
Power lines	____
Radiological	X
Heavy equipment	X

Other:

Potential bites and scratches X

4.2 Physical Hazards

Workers within OU 7 may be also subjected to physical stresses, including cold and heat stress. Investigative activities may take place during a wide range of weather conditions, leading to possible cold or heat stress conditions.

4.2.1 Cold Stress

When working outdoors in temperatures below freezing, workers are susceptible to frostbite. Exposure to extreme cold can cause severe injury to the body surface or can result in profound generalized cooling, causing death. In cold weather, precautions such as wearing insulated garments and taking warm-up breaks in temperature-controlled areas (when necessary) should be taken to prevent cold exposure. Symptoms of cold exposure include the following:

- Incipient frostbite, characterized by sudden blanching or whitening of the skin

- Superficial frostbite, which causes the skin to become waxy or white and superficially firm, but resilient beneath

- Deep frostbite, characterized by cold, pale, solid skin tissues

- Hypothermia, caused by rapid cooling of the body temperature to less than 95°F. Symptoms include shivering, apathy, listlessness, sleepiness, unconsciousness, glassy stare, slow pulse and respiratory rate, and freezing of the extremities.

4.2.2 Heat Stress

A worker's risk for developing heat stress is greatly increased when wearing PPE, which limits the body's normal heat exchange mechanisms and increases energy expenditure. A program to recognize potential heat stress situations, prevent episodes, and control hazards will be implemented where necessary. The program will include heat stress monitoring, adequate rest breaks, fluid replacement, acclimatization, and personal cooling systems. Heat stress can cause health effects that range from heat fatigue to serious illness or death. Signs and symptoms of heat stress include the following:

- Heat rash, which may result from continuous exposure to heat or humid air

- Heat cramps, caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include muscle spasms or pain in hands, feet, or abdomen.

- Heat exhaustion, which results from increased stress on various body organs or systems, including inadequate blood circulation due to cardiovascular system inefficiency or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; or fainting.

- Heat stroke, the most serious form of heat stress, which occurs when the body's temperature regulation system fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occur. Signs and symptoms of heat stroke are red, hot, usually dry skin; reduced or lack of perspiration; nausea; dizziness and confusion; strong, rapid pulse; or coma. The body temperature often exceeds 102°F.

Note: Personnel exhibiting symptoms of heat exhaustion will be immediately removed from fieldwork. PPE will be removed, and vital signs will be monitored. If body temperature exceeds 101°F (oral temperature), the individual will be transported to the medical facility for evaluation. If signs of heat stroke are detected, the individual will be transported immediately to the medical facility for evaluation and/or treatment. First aid will be administered as appropriate.

4.3 Potential Contaminants of Concern

The goal of this addendum to the health and safety plan for OU 7 is to protect workers from the adverse health effects resulting from overexposures to chemical and radiological hazards and to minimize hazard during drilling activities.

Potential contaminants of concern (PCOCs) identified during the Phase I RFI/RI are present in media in areas where drilling and soil sampling activities are planned. These PCOCs include metals, radionuclides, volatile organic compounds, semivolatile organic compounds, polychlorinated biphenyls, and total dissolved solids. Tables 1, 2, and 3 lists PCOCs at OU 7 (DOE 1994). Workers may encounter toxic vapors and organic contaminants in soils and groundwater during drilling operations.

Table 1
PCOCs in Surface Soils at the East Landfill Pond

Analyte	Inferential Statistical Tests[1]	Hot-Measurement Test[2]	Detection Frequency	Sample Mean[3]	Sample Concentration Range[3]
0 to 2 inches					
Metals					
Arsenic		X	133/133	5	1.8 - 13.2
Barium		X	133/133	191	56.3 - 1,120
Calcium	X	X	132/132	9,277	1,890 - 5,480
Lead		X	133/133	27	6.4 - 167
Magnesium		X	133/133	2,631	921 - 7,910
Sodium		X	127/133	117	22.6 - 1,280
Strontium	X		9/9	50.1	36.1 - 80.6
Vanadium		X	133/133	31	11.9 - 86.2
Zinc		X	133/133	56	21.5 - 101
Radionuclides					
Americium-241		X	119/119	0.03	0 - 1.076
Radium-226	X	X	79/79	1.0	0.4355 - 1.787
Water-Quality Parameters					
Nitrate/Nitrite		X	104/133	4	1 - 45
0 to 10 inches					
Metals					
Arsenic		X	67/67	5	1.2 - 15.7
Barium		X	67/67	201	30 - 546
Calcium	X	X	67/67	7,790	2,410 - 37,700
Selenium		X	36/67	0.4	0.24 - 2.4
Radionuclides					
Americium-241		X	66/66	0.0088	0.00057 - 0.05813

[1] Statistical tests, including the Gehan test, Quantile test, Slippage test, and t-test, used to identify PCOCs.

[2] Statistical test used to identify PCOCs based on a comparison to the background $UTL_{95/95}$ concentration. The $UTL_{95/95}$ is defined as the upper tolerance interval of the 99th percentile at the 99-percent confidence level.

[3] Metal and water-quality parameter concentrations reported in milligrams per kilogram. Radionuclide concentrations report in picocuries per gram.

Definitions:

PCOCs potential contaminants of concern

X denotes that analyte was identified as a PCOC using the test(s) as noted

Table 2
PCOCs for UHSU Groundwater

Analyte	Inferential Statistical Tests[1]	Hot-Measurement Test[2]	Background UTL 99/99 Concentration[3]	Detection Frequency	Sample Mean[4]	Sample Concentration Range[5]
Dissolved Analytes						
Metals						
Aluminum		X	1,868	156/325	201	5 - 13,700
Antimony		X	55	57/329	25	6 - 66.8
Arsenic	X		1,024	54/321	20	0.7 - 1,000
Barium	X	X	186	330/330	154	7.6 - 940
Cadmium		X	5	24/329	2	1 - 15.8
Calcium	X	X	152,175	330/330	73,581	11,700 - 566,000
Chromium		X	14	68/328	6	2 - 34.3
Cobalt	X	X	48	67/330	18	2 - 68.3
Copper	X	X	44	110/390	26	1 - 1,170
Iron	X	X	1,730	180/325	5,061	2.4 - 146,000
Lithium		X	196	240/327	189	1 - 10,000
Magnesium	X	X	34,481	325/330	16,487	2,700 - 102,000
Manganese	X	X	292	277/330	510	1 - 9,230
Molybdenum		X	202	62/330	515	2 - 9,000
Nickel	X	X	38	121/329	21	2 - 795
Potassium	X		475,297	249/330	2,702	112 - 48,700
Selenium		X	533	76/328	30	1 - 924
Sodium	X	X	160,693	330/330	60,479	5,600 - 493,000
Strontium	X	X	2,022	323/330	758	65.7 - 81,700
Zinc	X	X	66	216/330	45	1.3 - 1,240
Radionuclides						
Gross Beta	X	X	41	312/312	5	-7.2 - 43.17
Radium-226	X	X	0.6	71/71	0.8	0.12 - 2.17
Strontium-89,90	X	X	2.2	230/230	0.5	-0.18 - 11.17
Total Analytes						
Metals						
Aluminum	X	X	26,324	164/173	15,953	13 - 456,000
Antimony	X	X	52	26/169	27	8 - 115
Arsenic	X	X	8	86/172	5	0.7 - 70.70
Barium	X	X	311	163/173	314	16.1 - 5,060
Beryllium	X	X	4	41/171	3	0.8 - 32
Cadmium		X	4	35/173	3	1 - 19
Calcium	X	X	148,662	173/173	80,210	14,300 - 560,000
Chromium	X	X	192	120/174	26	2 - 580
Cobalt	X	X	44	72/173	22	2 - 228
Copper	X	X	42	109/173	160	2 - 7,140
Iron	X	X	32,398	168/173	27,358	16.4 - 656,000
Lead	X	X	20	133/173	14	1 - 263
Lithium	X	X	177	132/173	38	2.6 - 266

Analyte	Inferential Statistical Tests[1]	Hot-Measurement Test[2]	Background UTL 99/99 Concentration[3]	Detection Frequency	Sample Mean[3]	Sample Concentration Range[3]
Magnesium	X	X	33,725	171/173	19,479	3,010 - 118,000
Manganese	X	X	643	170/173	841	2.2 - 9,260
Mercury	X	X	0.2	22/173	0.2	0.2 - 1.50
Molybdenum		X	204	29/170		2 - 60.3
Nickel	X	X	101	107/173	41	2 - 1,070
Potassium	X	X	5,243	155/173	5,098	319 - 47,800
Selenium	X	X	131	29/165	27	1 - 815
Silicon	X	X	62,830	121/121	34,223	2,720 - 288,000
Silver	X	X	7	23/173	38	2 - 3,040
Sodium	X	X	147,829	172/172	59,379	8,200 - 1,230,000
Strontium	X	X	1,110	164/168	538	83.2 - 3,720
Tin		X	170	38/169	76	10 - 267
Vanadium	X	X	71	115/172	40	2 - 754
Zinc	X	X	184	148/171	185	6.3 - 8,000
Radionuclides						
Americium-241	X	X	0.04	267/267	0.01	-0.43 - 0.63
Cesium-137		X	1.1	140/140	0.1	-0.756 - 1.13
Radium-226	X	X	1.29	7/7	0.60	0.35 - 1.32
Strontium-89,90	X		1.2	19/19	0	0 - 1
Volatile Organic Compounds						
1,1-Dichloroethane	NA	NA	NA	63/393	3	0.5 - 50
1,1-Dichloroethene	NA	NA	NA	36/394	4	1 -100
1,1,1-Trichloroethane	NA	NA	NA	68/393	9	2 - 370
1,1,2-Trichloroethane	NA	NA	NA	2/394	2	0.4 - 50
1,2-Dichloroethene	NA	NA	NA	72/388	4	1 - 130
1,2-Dichloropropane	NA	NA	NA	20/394	3	1 - 50
1,4-Dichlorobenzene	NA	NA	NA	3/56	5	6 - 100
2-Butanone	NA	NA	NA	6/276	13	2 - 1,300
2-Hexanone	NA	NA	NA	3/374	5	2 - 100
4-Methyl-2-pentanone	NA	NA	NA	8/378	12	3 - 1,100
Acetone	NA	NA	NA	40/358	12	1 - 990
Benzene	NA	NA	NA	33/393	3	0.1 - 50
Bromodichloromethane	NA	NA	NA	1/394	3	1 - 50
Bromoform	NA	NA	NA	2/394	2	1 - 50
Carbon Disulfide	NA	NA	NA	2/389	3	0.1 - 50
Carbon Tetrachloride	NA	NA	NA	18/393	3	1 - 50
Chlorobenzene	NA	NA	NA	5/394	3	0.3 - 50
Chloroethane	NA	NA	NA	13/393	6	2 - 83
Chloroform	NA	NA	NA	35/393	3	1 - 50
Ethylbenzene	NA	NA	NA	18/394	4	0.3 - 110
Methylene Chloride	NA	NA	NA	59/391	3	0.4 - 50
Tetrachloroethene	NA	NA	NA	80/391	4	0.4 - 170
Toluene	NA	NA	NA	32/394	7	0.2 - 580

Analyte	Inferential Statistical Tests[1]	Hot-Measurement Test[2]	Background UTL 99/99 Concentration[3]	Detection Frequency	Sample Mean[3]	Sample Concentration Range[3]
Total Xylenes	NA	NA	NA	25/393	6	0.4 - 270
Trichloroethene	NA	NA	NA	100/392	9	1 - 190
Vinyl Chloride	NA	NA	NA	26/394	5	2 - 100
Semivolatile Organic Compounds						
2-Chloronaphthalene	NA	NA	NA	1/56	5	5 - 100
2-Methylphenol	NA	NA	NA	3/55	5	3 - 100
2,4-Dimethylphenol	NA	NA	NA	4/55	5	7 - 100
2,4,5-Trichlorophenol	NA	NA	NA	1/55	25	3 - 500
4-Methylphenol	NA	NA	NA	11/55	84	6 - 2,100
4-Nitrophenol	NA	NA	NA	1/53	26	42 - 500
Acenaphthene	NA	NA	NA	2/56	5	2 - 100
Benzoic Acid	NA	NA	NA	11/48	102	6 - 1,300
Bis(2-ethylhexyl)phthalate	NA	NA	NA	16/56	7	2 - 100
Di-n-Butyl Phthalate	NA	NA	NA	5/56	5	2 - 100
Diethyl Phthalate	NA	NA	NA	11/56	8	3 - 50
Fluorene	NA	NA	NA	1/56	5	2 - 100
Naphthalene	NA	NA	NA	9/56	6	3 - 100
Pentachlorophenol	NA	NA	NA	3/55	25	4 - 500
Phenanthrene	NA	NA	NA	3/56	5	2 - 100
Phenol	NA	NA	NA	4/55	10	8 - 130
Water-Quality Parameters						
Chloride		X	63,635	295/318	54,593	760 - 530,000
Cyanide		X	12	29/225	5	-0.6 - 20
Fluoride		X	2,024	316/326	542	100 - 8,600
Nitrate/Nitrite	X	X	55,685	276/313	7,258	20 - 290,000
Sulfate		X	613,607	322/326	175,331	500 - 19,000,000
Total Dissolved Solids		X	1,290,550	342/342	550,219	85,000 - 5,100,000

[1] Statistical tests, including the Gehan test, Quantile test, Slippage test, and t-test, used to identify PCOCs.

[2] Statistical test used to identify PCOCs based on a comparison to the background $UTL_{99/99}$ concentration. The $UTL_{99/99}$ is defined as the upper tolerance interval of the 99th percentile at the 99-percent confidence level.

[3] All concentrations reported in micrograms per liter, except radionuclide concentrations, which are reported in picocuries per liter.

Definitions:

NA not applicable
PCOCs potential contaminants of concern
UHSU upper hydrostratigraphic unit
X denotes that analyte was identified as a PCOC using the test(s) as noted

Table 3
PCOCs for LHSU Groundwater

Analyte	Inferential Statistical Tests[1]	Hot-Measurement Test[2]	Background UTL 99/99 Concentration[3]	Detection Frequency	Sample Mean[3]	Sample Concentration Range[3]
Dissolved Analytes						
Metals						
Aluminum	X	X	214	20/39	79	13 - 264
Antimony		X	56	9/39	23	10 - 97.1
Arsenic		X	8	8/39	5	0.7 - 39.80
Barium	X	X	136	37/39	175	9.40 - 516
Beryllium	X	X	?	1/39	2	0.3 - 5
Cadmium	X	X	5	4/39	2	1 - 9.6
Calcium	X	X	104,319	39/39	71,485	13,000 - 601,000
Chromium	X	X	13	9/39	8	2 - 67.9
Cobalt	X	X	53	3/39	17	2 - 50
Copper	X	X	23	16/39	11	1 - 63
Iron		X	135	24/39	48	2.6 - 288
Lead		X	9	5/39	2	0.7 - 100
Lithium	X	X	134	32/39	49	10.7 - 261
Magnesium	X	X	19,990	37/39	13,238	1,280 - 185,000
Manganese	X	X	32	32/39	37	1 - 195
Mercury		X	0.7	0/38	NC	0.1 - 0.2
Molybdenum	X	X	163	22/39	63	4 - 435.00
Nickel	X	X	39	10/39	17	2.1 - 125
Potassium	X	X	7,544	38/39	4,386	1,560 - 12,100
Selenium	X	X	6	12/39	12	1 - 360
Silver	X	X	16	9/39	5	2 - 11.5
Sodium	X	X	601,966	39/39	185,046	31,900 - 490,000
Strontium	X	X	1,471	39/39	794	185 - 5,700
Thallium	X	X	?	1/39	4	1.00 - 10
Tin	X	X	199	6/39	63	10 - 152
Zinc		X	47	20/39	14	2 - 91.2
Radionuclides						
Gross Alpha	X	X	26.3	3/3	14.8	2.9 - 33.1
Gross Beta	X	X	14	50/50	6	1.36 - 16.27
Strontium-89,90		X	1.25	22/22	0.29	-0.039 - 0.980
Uranium-235		X	0.25	50/50	0.06	-0.021 - 0.334
Uranium-238	X	X	6.3	50/50	1.2	0 - 4.196
Total Analytes						
Metals						
Aluminum		X	13,788	19/19	14,795	1,140 - 79,800
Arsenic		X	11	12/19	6	0.7 - 36.40
Barium	X	X	1,424	19/19	272	27.70 - 1,180
Calcium	X	X	127,687	19/19	39,174	22,700.00 - 108,000
Chromium	X		1,210	17/19	36	3.00 - 204

Analyte	Inferential Statistical Tests[1]	Hot-Measurement Test[2]	Background UTL 99/99 Concentration[3]	Detection Frequency	Sample Mean[3]	Sample Concentration Range[3]
Copper		X	1,338	19/19	33	3.3 - 229
Iron		X	18,339	19/19	14,831	1,020 - 63,400
Lead		X	22	18/19	19	1.1 - 115
Lithium		X	150	15/19	30	10.8 - 91.9
Magnesium	X		28,140	19/19	9,994	2,850 - 27,000
Manganese		X	615	19/19	196	30.70 - 616
Nickel	X		1,266	9/19	32	3 - 173
Potassium		X	8,801	19/19	5,366	3,110 - 11,700
Selenium	X	X	5	8/19	2	1.00 - 3.10
Silicon		X	44,790	16/16	25,951	4,210 - 88,900
Silver		X	236	2/19	4	2 - 5.3
Sodium	X	X	659,404	19/19	75,189	32,700 - 437,000
Strontium	X	X	1,720	19/19	474	241 - 1,470
Tin		X	221	3/19	55	10 - 53.2
Zinc		X	1,401	19/19	122	14 - 572
Radionuclides						
Americium-241		X	0.072	26/26	0.004	-0.002 - 0.015
Cesium-137		X	1.05	7/7	0.12	-0.23 - 0.48
Tritium		X	1,779	52/52	12	-330 - 300
Uranium-235		X	0.27	1/1	0.08	0.08 - 0.08
Volatile Organic Compounds						
1,1-Dichloroethene	NA	NA	NA	1/64	2	2 - 5
1,1,1-Trichloroethane	NA	NA	NA	1/64	3	5 - 10
Acetone	NA	NA	NA	6/58	6	4 - 36
Chlorobenzene	NA	NA	NA	1/64	2	1 - 5
Methylene Chloride	NA	NA	NA	14/64	4	1 - 19
Toluene	NA	NA	NA	5/64	3	1 - 5
Total Xylenes	NA	NA	NA	1/64	2	1 - 5
Semivolatile Organic Compounds						
Bis(2-ethylhexyl)phthalate	NA	NA	NA	2/14	6	4 - 24
Di-n-Butyl Phthalate	NA	NA	NA	1/14	5	5 - 11
Naphthalene	NA	NA	NA	1/14	5	2 - 11
Water-Quality Parameters						
Nitrate/Nitrite		X	4,180	36/44	858	20 - 2400

(notes continued)

[1] Statistical tests, including the Gehan test, Quantile test, Slippage test, and t-test, used to identify PCOCs.

[2] Statistical test used to identify PCOCs based on a comparison to the background $UTL_{99/99}$ concentration. The $UTL_{99/99}$ is defined as the upper tolerance interval of the 99th percentile at the 99-percent confidence level.

[3] All concentrations reported in micrograms per liter, except radionuclide concentrations, which are reported in picocuries per liter.

Definitions:

LHSU	lower hydrostratigraphic unit
NA	not applicable
PCOCs	potential contaminants of concern
X	denotes that analytes was identified as a PCOC using the test(s) noted

5. PERSONAL PROTECTION

Based on an evaluation of the potential hazards from the Phase I RFI/RI, the level of personal protection defined for the intrusive activities on the project shall be the level D ensemble, described in Table 4 (EG&G 1993). Level D will be maintained until airborne levels of identified contaminants or radiological limits are detected at the action limits. This guidance is described in more detail in the air monitoring section of the SSHSP-OU 7 (Appendix A). Table 5 provides a site activity risk analysis to determine appropriate PPE and monitoring requirements per site activity. Modified level D using Tyvek suits shall be used in dusty or muddy environments. Polyethylene-coated Tyvek shall be worn for protection from splash hazards. This level of protection is intended to minimize exposure through dermal contact and ingestion of contaminated soils.

Sampling personnel will not conduct work activities alone at OU 7. The "buddy" system, as specified in 29 Code of Federal Regulations (CFR) 1910.120 (d)(3), will be implemented at the site. The buddy teams working at the site will maintain visual and audible contact so that they can provide emergency assistance to each other, if needed.

The potential exists for workers to be exposed to contaminants through inadvertent ingestion. Therefore, no eating, drinking, or smoking will be allowed in the area of OU 7. Also, personnel will wash their hands and faces at breaks.

Table 4
Specific Requirements for Each Level of Protection

Level of Protection	Equipment	Protection Provided	Should Be Used When	Limiting Criteria
D	Required: • Steel-toed boots or shoes • Long legged pants • Hard hat Optional, as Required • Work gloves • Coveralls • Hearing protection • Safety glasses or chemical splash goggles	No respiratory protection. Minimal skin protection.	• The atmosphere contains no known hazard. • Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.	• May be worn in support, CRZ, and EZ. • This level should not be worn in the EZ. • The atmosphere must contain at least 19.5 percent oxygen.
Modified D	Required: All requirements of level D plus: • CP suit - either Tyvek for dusty or muddy environments or polyethylene-coated Tyvek for liquid splash hazards. • Inner and outer gloves Optional, as Required: • Splash shield • Hearing protection • Eye protection	Increased skin and splash protection, but no respiratory protection.	Working in dusty areas or in areas with splash potential.	• May be worn in the exclusion zone. • The atmosphere must contain at least 19.5 percent oxygen.
C	• Required: • Full-facepiece, air-purifying respirator equipped with both organic vapor and HEPA filter cartridges • CP clothing dependent on the specific area working: • - Tyvek full body suit for dry areas, or, • - Polyethylene-coated Tyvek for situations in which splash hazards exist • Inner latex glove and outer nitrile gloves (taped to suit) • Chemical-resistant safety boots/shoes or steel-toed work boots with latex overshoes (taped to suit) • Hard hat • Two-way radio	Respiratory protection up to 50 times the permissible exposure level of selected contaminants (particulates and some organic compounds), and skin and splash protection from contaminated dust and water.	• The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin • The types of air contaminants have been identified, concentrations measured, and a canister is available that can remove the contaminant • All criteria for the use of air-purifying respirators are met	• Atmospheric concentration of chemicals must not exceed IDLH levels • The atmosphere must contain at least 19.5 percent oxygen

Level of Protection	Equipment	Protection Provided	Should Be Used When	Limiting Criteria
C (continued)	communications • Optional, as Required: • Coveralls under CP suit • Face shield for splash protection • Long cotton underwear			

Definitions:

CP	chemically protective
CRZ	contamination reduction zone
EZ	exclusion zone
HEPA	high efficiency particulate air
IDLH	immediately dangerous to life and health

Table 5
Site Activity Risk Analysis

Field Location	Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
General (Common Hazards)	All These hazards are presumed present at all hazardous substance sites even when activities are not present. Site activities may increase the magnitude or number of hazards.	Heat Stress Cold Stress	Core Temperature; WBGT when ambient temperature is above 80° F; and, Pulse.	Wear adequate thermal clothing in cold temperatures.	Adjust work/rest cycles and fluid intake to maintain normal body temperature.
		Fugitive dusts which may be contaminated with heavy metals, radionuclides, or chemical contaminants.	Particulate Dust Monitoring (miniram).	Level D.	Work upwind of dusty area if possible.
				Combination HEPA/organic vapor cartridges when dust concentration exceeds 5 mg/m^3	Suppress dust to less than 2.5 mg/m^3 with water whenever the water will not interfere with analysis.
		Ticks	Visual Inspection	Wear long-legged pants and work boots.	Use tick repellent containing over 30 percent DEET on exposed skin areas and hair
		Prairie Rattlesnake	Visual Inspection	Wear long-legged pants and work boots.	Make noise and probe areas with long stick before stepping.
		Black Widow Spider	Visual Inspection	None	Wear Gloves

Field Location	Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
IHSS 114, IHSS 203, East Landfill Pond, surrounding areas of OU 7	Non-intrusive activities such as radiological and geographical surveys	Common hazards listed above.	Particulate Dust Monitoring	Level D	None
		Radionuclides/8 (Instruments shall be used in accordance with EMRGs)	Alpha monitoring: Bicron Frisk-Tech A100. Beta/gamma monitoring: Ludlum Model 12 with 44-9 probe.	Level D	None
North and South slopes of East Landfill Pond, and downgradient of East Landfill Pond at No Name Gulch	Intrusive activities such as borings and monitoring well installations	Buried Drums. Drums and other containerized wastes will be presumed to be present.	HNu (PID), CGI.	Wear Level D until direct reading instrument action levels are exceeded, then Level C.	Avoid metal mass. Offset boreholes/wells by at least 10 feet.
		Underground utilities	Check with plant or public utility locate		Offset boreholes/wells by at least 10 feet.
		Overhead Utilities	Visual inspection		De-energize high voltage lines in accordance with lock-out/tag-out regulations or maintain safe distances as specified by OSHA.

Field Location	Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
IHSS 114, IHSS 203, East Landfill Pond, and surrounding areas of OU 7	Intrusive activities such as borings and monitoring well installations	Volatile chemicals	PID	Wear Level D until direct reading instrument action levels are exceeded, then Level C.	None
		Site general hazards and potential for elevated concentrations of radionuclides.	Alpha Monitoring: Bicron Frisk-Tech A-100 or comparable Rocky Flats-approved instrument Beta/gamma monitoring: Bicron Frisk-Tech B-50 or comparable Rocky Flats-approved instrument	Wear Level D until direct reading instrument action levels are exceeded, then Level C.	Dust suppression using water spray.

Field Location	Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
IHSS 114, IHSS 203, East Landfill Pond, and surrounding areas of OU 7	Intrusive activities such as borings and monitoring well installations.	Fugitive dusts which may be contaminated with heavy metals, radionuclides or chemical contaminants.	Particulate Dust Monitoring	Wear Level D until direct reading instrument action levels are exceeded, then Level C.	Dust suppression using water spray.
		Methane (explosive atmosphere)	CGI	If > 20 percent LEL, withdraw and allow methane to dissipate	No drilling within the Present Landfill (IHSS 114) will be performed during the Phase II RFI/RI.
	Surface Sampling including East Landfill Pond water and sediment sampling	Radionuclides	Radiation monitoring with Bicron Frisk-Tech A-100 and B-50 or comparable alpha/beta/gamma direct reading instruments	Wear Level D until direct reading instrument action levels are exceeded, then Level C.	Sampling of East Landfill Pond water and sediments will not be performed during the Phase II RFI/RI.

Definitions:

CGI	combustible gas indicator
HEPA	high efficiency particulate air
IHSS	individual hazardous substance site
LEL	lower explosive limit
mg/m^3	milligrams per cubic meter
OSHA	Occupational Safety and Health Act
OU	operable unit
PID	photoionization detector
WBGT	wet bulb globe temperature

6. SITE MONITORING

Direct reading or real-time monitoring instruments provide instantaneous data on the concentration or identity of airborne contaminants present on the site. This data will be used to determine the appropriate levels of protection for workers in the immediate vicinity of the monitors, identify physical hazards such as explosive gas mixtures, and to identify situations that are unsafe for personnel in any level of protection. These monitors may also be utilized to determine the effectiveness of decontamination procedures on personnel and equipment. Table 6 identifies some of the action limits for the direct-reading instruments.

Monitoring of personnel and equipment for radiological contamination will be performed when required by EG&G SOPs.

Table 6
Direct Reading Action Limits

Instrument	Monitoring Guidelines	Instrument Reading	Mandatory Action
HNu PID with 11.7 eV probe	Monitor regularly during all intrusive activities. Survey each area prior to work. Monitor in the worker's BZs.	0 - 1 ppm in BZ above background	No specific action. No respiratory protection required for organic vapors.
		> 1 ppm in BZ	Use colorimetric tubes to identify hazard above background.

Colormetric Tubes				
Gas or Vapor to be Measured	***Detctor Tube to be Used**	**Monitoring Guidelines**	**Action Limits**	**Mandatory Action**
1,1-Dichloroethane	Methyl Chloroform	when PID reading is greater than action limit in breathing zone	50	Evacuate site and reevaluate
1,1,1-Trichloroethane	Methyl Chloroform	when PID reading is greater than action limit in breathing zone	175	Evacuate site and reevaluate
1,1,2-Trichloroethane	Methyl Chloroform	when PID reading is greater than action limit in breathing zone	5	Evacuate site and reevaluate
1,2- Dichloroethane	Methyl Chloroform	when PID reading is greater than action limit in breathing zone	5	Evacuate site and reevaluate
1,2-Dichloropropane	Methyl Chloroform	when PID reading is greater than action limit in breathing zone	30	Evacuate site and reevaluate
1,4-Dichlorobenzene	Dichlorobenzene	when PID reading is greater than action limit in breathing zone	35	Evacuate site and reevaluate
2-Butanone	Acetone	when PID reading is greater than action limit in breathing zone	100	Evacuate site and reevaluate
Carbon Tetrachloride	Carbon Tetrachloride	when PID reading is greater than action limit in breathing zone	1	Evacuate site and reevaluate
Chloroform	Chloroform	when PID reading is greater than action limit breathing zone	1	Evacuatpe site and reevaluate
Methylene Chloride	Methylene Chloride	when PID reading is greater than action limit in breathing zone	250	Evacuate site and reevaluate
Vinyl Chloride	Vinyl Chloride	when PID reading is greater than action limit breathing zone	0.5	Evacuate site and reevaluate

CGI	Monitor regularly during drilling and sampling in the landfill area.	0 - 10 percent LEL	No special precaution.
		10 - 20 percent LEL	Limit access to area. Use non-sparking equipment. Monitor continuously. No smoking in area. Remove ignition sources.
		> 20 percent LEL	Evacuate immediate area. Turn off all ignition sources. Wait for vapors to dissipate and retest. Do not continue work in area until readings are lower.
PDM-3 Dust Monitor	Monitor whenever visible dust is generated on the site. Monitor drilling, soil sampling, and equipment moving.	0 - 5 mg/m^3	No special precautions.
		5 - 50 mg/m^3	Upgrade respiratory protection to Level C with HEPA and organic vapor cartridges and implement dust suppression actions.
		> 50 mg/m^3	Evacuate immediate area. Use dust suppression (if possible). Wait for dust generation to cease or dissipate.
Bicron Frisk - Tech with A100 probe	Monitor for personnel contamination in accordance with EMRG 2.1, 3.1, and 3.02.	0 - 100 dpm/100 cm^3	No special precautions.
		> 100 dpm/100 cm^3	PPE considered contaminated.
Ludlum Model 31 with pancake probe	Monitor for personnel contamination in accordance to EMRG 2.1, 3.1, and 3.02.	0 - 100 CPM	No special precautions.
		> 100 CPM above background	PPE considered contaminated.

Definitions:

BZ	breathing zone
CGI	combustible gas indicator
CPM	counts per minute
dpm/100 cm^3	disintegrations per minute per 100 cubic centimeters
eV	electron volt
HEPA	high efficiency particulate air
HSS	health and safety specialist
LEL	lower explosive limit
mg/m^3	milligrams per cubic meters
PID	photoionization detector
PPE	personal protective equipment
PPM	parts per million

EG&G Rocky Flats Plant OU 7 Site-Specific Health and Safety Plan Addendum	Manual: Section: Page: Effective Date:	RFP/ERM-94-00034 Section 7, Rev. 0 1 of 1 SEP 0 2 1994
Category	Organization:	RPD
Title: General Safety Procedures	Approved By: E Mosl Name	8/29/94 Date

7. GENERAL SAFETY PROCEDURES

1. All drilling operations shall be monitored for the presence of toxic air contaminants. This air monitoring shall be conducted by the HSS or a designated Health and Safety Specialist-in-Training (HSST).

   The HNu Photoionization Detector (PID) and a combustible gas indicator (CGI) are required for monitoring during drilling operations.

2. Fire extinguishers shall be installed in all vehicles and heavy equipment. Fire extinguishers, electrical equipment and wiring shall conform to the applicable requirements of 29 CFR 1926.

3. Smoking shall not be permitted in buffer zone as per HSP 20.01.

4. Personnel shall avoid the area immediately downwind of any drilling unless the drilling is monitored for VOCs and declared safe by HSS or HSST.

5. Employees shall be issued and utilize appropriate health and safety equipment as determined by this HASP addendum, SSHSP-OU 7, EG&G SOPs Industrial Hygiene, Occupational Safety, and Radiological Engineering.

Personnel work limitations:

1. Work will be stopped if sustained winds exceed 35 miles per hour for a 15 minute average. Work will be stopped if onsite wind monitor alarms activate.

2. If air temperature is below 40°F, precautions will be implemented to prevent cold stress effects.

Safety meetings will be held weekly. Personnel are required to attend and sign a roster (attendance sheet) that will be maintained by the HSS. Meeting minutes will be documented and attached to the roster.

8. TRAINING AND MEDICAL MONITORING REQUIREMENTS

All persons must have completed 40/8-hour OSHA training and have passed a medical exam to be eligible for fieldwork at OU 7.

Additional site-specific training for onsite personnel that may be required by EG&G includes:

- General Employee Training (GET) for Subcontractors,
- Radiation Worker—Level II,
- RCRA Supervisor Checklist,
- RCRA (computer-based training[CBT]),
- Hazard Communication (CBT),
- Respiratory Indoctrination, and
- Respiratory Fit Test.

All personnel training and medical certifications will be maintained onsite.

9. EMERGENCY INFORMATION

9.1 Site Resources

Emergency resources available at Rocky Flats site include:

- Medical clinic — Extension 2911
- HAZMAT team — Extension 2911
- Fire department — Extension 2911
- Emergency medical response — Extension 2911
- Police/security — Extension 2911

Note: First aid should be administered by onsite medical personnel if possible. First response to medical emergencies should be performed by personnel trained in use of first-aid methods that protect against exposure to bloodborne pathogens. Field personnel involved in routine duty are not included under the OSHA Bloodborne Pathogens Rule (29 CFR 1910.1030). However, Stoller field personnel have now or will have training in the use of methods to control exposure to bloodborne pathogens. First-aid kits will contain the appropriate PPE.

9.2 Emergency Telephone Numbers

Ambulance	Extension 2911
Medical	Extension 2911
Fire	Extension 2911
Police	Extension 2911

Telephone will be located at the Stoller field trailer in the T891 area (trailer to be assigned).

The project manager is responsible for ensuring complete and appropriate implementation of the HASP addendum day-to-day operations.

9.3 Contingency Plans

Spill or accidental release: Extension 2911

Fire or explosion: Extension 2911 or use fire alarm or fire phone

Personal injury: Life Threatening, Extension 2911

Non-Life Threatening, Extension 2914

- All first aid is to be administered by onsite medical personnel only. Stoller personnel or subcontractors certified and trained in first aid/CPR can administer first aid assistance until the arrival of emergency and medical personnel.
- Evacuate area if in immediate danger and call 2911.

NEAREST HOSPITAL: Onsite medical facility—Building 122; see Figure 3 for location and most direct route.

EVACUATION PROCEDURES: Follow instructions given over public address system; otherwise evacuate upwind.

HAZARDOUS WASTE HANDLING: Workers must follow the requirements as per I-C49-HWRM-04, Rev. 0, Release Response and Reporting when operations include hazardous and mixed waste generating, receiving, segregating, packaging, storing, and transferring procedures.

EG&G Rocky Flats Plant OU 7 Site-Specific Health and Safety Plan Addendum	Manual: Section: Page: Effective Date:	RFP/ERM-94-00034 Section 10, Rev. 0 1 of 3 SEP 0 2 1994
Category	Organization:	RPD
Title: Decontamination Procedures	Approved By: Name	Date: 8/29/94

10. DECONTAMINATION PROCEDURES

The purpose of decontamination is to remove hazardous substances from equipment and personnel. Any heavy equipment such as drill rigs must be checked for contamination and decontaminated (if required) prior to leaving the site. Current applicable EG&G SOPs shall be utilized for specific decontamination requirements. Specific decontamination procedures are addressed in the SSHSP-OU 7 (Appendix A).

Unrestricted release of equipment shall be performed in accordance with EMRGs and HSP 18.10. PPE generated from field activities at OU 7 shall be handled in accordance with EMD Operating Procedures Manual, Vol 1: FO.06.

Table 7 contains radioactive surface contamination limits for unrestricted release of equipment.

Table 7
Radioactive Surface Contamination Limits for Unrestricted Release [1]

Radionuclides [2]	Average Total [3,4] (Fixed + Removable) (dpm/100 cm^2)	Maximum Total [4,5] Fixed + Removable) (dpm/100 cm^2)	Removable [4,6] (dpm/100cm^2)[7]
Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231	100 [8]	300	20
Th-Natural, Sr-90, I-131, I-133, Ra-223, Ra-224, U-232, Th-232	1,000	3,000	200
U-Natural, Sr-90, I-131, I-133, Ra-224, U-232, Th-232	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous Fission) except Sr-90 and others noted above.[9]	5,000	15,000	1,000

[1] These limits are promulgated by DOE 5400.5, Table IV-1, and NRC Regulatory Guide 1.86. In certain cases, the limits established for unrestricted release are above the conditional release limits in Appendix 2. However, it should be understood that the limits in Appendix 1 are upper limits, and to which the ALARA process is also applied to the unrestricted release of any item.

[2] Where surface contamination by both alpha and beta-gamma emitting radionuclides exists, the limits established for alpha and beta gamma-emitting radionuclides should apply independently.

[3] Measurements of average contamination should not be averaged over an area of more than $1m^2$. For objects of less surface area, the average should be derived for each object.

[4] The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h respectively, at 1 cm.

[5] The maximum contamination level applies to an area of not more than 100 cm^2.

[6] The amount of removable material per 100cm^2 of surface area shouldbe determined by wiping an area of that size with a dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

[7] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

(Notes continued)

[8] Average total alpha is obtained by dividing the sums of dpm/100cm^2 of all 1-minute counts by "N", the number of 1-minute readings taken. If all of the 1-minute readings were less than 100 dpm/100cm^2, then averaging is not required.

[9] This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from other fission products or mixtures where the Sr-90 has been enriched.

[9] This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from other fission products or mixtures where the Sr-90 has been enriched.

EG&G Rocky Flats Plant OU 7 Site-Specific Health and Safety Plan Addendum	Manual: Section: Page: Effective Date:	RFP/ERM-94-00034 Section 11, Rev. 0 1 of 1 SEP 0 2 1994
Category	Organization:	RPD
Title: Plan Approval	Approved By: E Most Name	8/29/94 Date

11. PLAN APPROVAL

Plan Prepared By: Virgil M. Palencia, The S.M. Stoller Corporation

Health & Safety Manager: Virgil M. Palencia, The S.M. Stoller Corporation

Project Manager: Myra Vaag, The S.M. Stoller Corporation

EG&G Rocky Flats Plant OU 7 Site-Specific Health and Safety Plan Addendum	Manual: Section: Page: Effective Date:	RFP/ERM-94-00034 Section 12, Rev. 0 1 of 1 SEP 0 2 1994
Category	Organization:	RPD
Title: Record of Health and Safety Plan Review	Approved By: E Mosk Name	8/29/94 Date

12. RECORD OF HEALTH AND SAFETY PLAN REVIEW

The undersigned have reviewed the contents of this HASP addendum and the Site-Specific Health and Safety Plan, Implementation of Phase I RFI/RI Work Plan, Operable Unit No. 7 (SSHSP-OU 7) (Appendix A). They understand the provisions and objectives of the work plan and are fully aware of the risks and hazards involved in completing these objectives. They additionally agree to comply with the requirements and protocols set forth in this document and SSHSP-OU 7.

NAME	SIGNATURE	DATE

EG&G Rocky Flats Plant OU 7 Site-Specific Health and Safety Plan Addendum	Manual: Section: Page: Effective Date:	RFP/ERM-94-00034 Section 13, Rev. 0 1 of 1 SEP 0 2 1994
Category	Organization:	RPD
Title: References	Approved By: Name	Date: 8/29/94

13. REFERENCES

DOE. 1991 Federal Facility Agreement and Consent Order (Interagency Agreement [IAG] Among U.S. DOE, EPA, and CDH). U.S. Department of Energy, Washington, D.C. January 22.

DOE. 1994. Technical Memorandum, Revised Work Plan, Operable Unit No. 7—Present Landfill (IHS 114) and Inactive Hazardous Waste Storage Area (IHSS 203) Draft Final Report. U.S. Department of Energy, Rocky Flats Site, Golden, CO. May 23.

EG&G. 1993. Letter from L.A. LeLievre (EG&G) to T.P. O'Rourke (EG&G), Downgrade of Respiratory Protection for Core Drilling and Sampling Operable Unit (OU) 7—LAL028-93. EG&G, Rocky Flats Plant, Inc., Golden, CO. February.

Rockwell International. 1987. Resource Conservation and Recovery Act Part B—Operating Permit Application for U.S. DOE Rocky Flats Plant, Hazardous and Radioactive Mixed Wastes, Revision 1. U.S. Department of Energy.

Appendix A
Site-Specific Health and Safety Plan
(October 1992)

SITE-SPECIFIC HEALTH AND SAFETY PLAN

IMPLEMENTATION OF PHASE I RFI/RI WORK PLAN
ROCKY FLATS PLANT
PRESENT LANDFILL (IHSS 114) AND
INACTIVE HAZARDOUS WASTE STORAGE AREA (IHSS 203)
OPERABLE UNIT NO. 7

EG&G Subcontract #ASC 221460RR

October 26, 1992

HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Site Specific Health and Safety Plan Implementation of Phase I RFI/RI Work Plan, Operable Unit 7, prepared by Walsh & Associates, Inc.

Subcontractor Document YES
EG&G Document NO

Radiological Operations

10/8/92
Date

HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Site Specific Health and Safety Plan Implementation of Phase I RFI/RI Work Plan, Operable Unit 7, prepared by Walsh & Associates, Inc.

Subcontractor Document YES
EG&G Document NO

Fire Protection

10/20/92
Date

HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Site Specific Health and Safety Plan Implementation of Phase I RFI/RI Work Plan, Operable Unit 7, prepared by Walsh & Associates, Inc.

Subcontractor Document YES
EG&G Document NO

Industrial Safety

10-16-92
Date

HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Site Specific Health and Safety Plan Implementation of Phase I RFI/RI Work Plan, Operable Unit 7, prepared by Walsh & Associates.

Subcontractor Document YES
EG&G Document NO

C. A Stephens
Health and Safety Area Coordinator

10-19-92
Date

HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Site Specific Health and Safety Plan Implementation of Phase I RFI/RI Work Plan, Operable Unit 7, prepared by Walsh & Associates, Inc.

Subcontractor Document YES
EG&G Document NO

Industrial Hygiene

10/19/92
Date

HEALTH AND SAFETY PLAN APPROVAL FORM

The following signature documents that this division at EG&G Rocky Flats, Inc., has reviewed the Health and Safety Plan and agrees that requirements which are managed by this division have been addressed in a technically correct manner.

Health and Safety Plan Title:

Draft Site Specific Health and Safety Plan Implementation of Phase I RFI/RI Work Plan, Operable Unit 7, prepared by Walsh & Associates.

Subcontractor Document (YES)
EG&G Document NO

Radiological Engineering

10/27/92
Date

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12.2 **LIST OF APPENDICES**

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LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
COC	Contaminants of Concern
CPM	Counts Per Minute
CPR	Cardio-Pulmonary Resuscitation
CRQL	Contract Required Quantitation Limit
CRZ	Contaminant Reduction Zone
dBA	Decibels
DOE	Department of Energy
EC	Emergency Coordinator
EMD	Environmental Management Department
EMRG	Environmental Management Radiological Guidelines
EPA	U.S. Environmental Protection Agency
eV	Electron Volt
EZ	Exclusion Zone
FIM	Field Implementation Manager
FTL	Field Team Leader
GET	General Employee Training
HASMAT	Hazardous Material
HSPM	Health and Safety Practices Manual
HSO	Health and Safety Officer
HSS	Health and Safety Specialist
HST	Health and Safety Technician
IAG	Interagency Agreement
IHSS	Individual Hazardous Substance Site
IWCP	Integrated Work Control Package
LEL	Lower Explosive Limit
MDA	Minimum Detectable Activity
mph	Miles Per Hour
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
OU7	Operable Unit 7
PCB	Polychlorinated Biphenyl

LIST OF ACRONYMS AND ABBREVIATIONS
Continued

PEL	Permissible Exposure Limit
PID	Photo-ionization Detector
PM	Project Manager
PPCD	Plan for Prevention of Contaminant Dispersion
PPE	Personal Protective Equipment
ppm	Parts Per Million
RCA	Radiologically Controlled Area
RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFP	Rocky Flats Plant
ROI	Radiological Operating Instructions
RPT	Radiation Protection Technologists
RPT's-IT	Radiation Protection Technologists-In-Training
SM/FOL	Site Manager/Field Operations Lead
SOP	Standard Operating Procedures
SSHSP	Site-Specific Health and Safety Plan
STOLLER	S.M. Stoller Corporation
TLV	Threshold Limit Value
TSP	Total Suspended Particulate
TWA	Time Weighted Average
VOC	Volatile Organic Compound
WALSH	Walsh & Associates, Inc.

SITE-SPECIFIC HEALTH AND SAFETY PLAN

IMPLEMENTATION OF PHASE I RFI/RI WORK PLAN
ROCKY FLATS PLANT
PRESENT LANDFILL (IHSS 114) AND
INACTIVE HAZARDOUS WASTE STORAGE AREA (IHSS 203)
OPERABLE UNIT NO. 7

1.0 INTRODUCTION

1.1 Policy

Walsh & Associates, Inc. (WALSH) has developed this safety plan for the S.M. STOLLER Corporation (STOLLER) in the implementation of activities associated with the Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) at Operable Unit 7 (OU7). This site-specific Health and Safety Plan (SSHSP) has been developed for compliance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Regulations 29 Code of Federal Regulations (CFR) 1910.120 for hazardous waste site workers at the Rocky Flats Plant (RFP). The intent of the SSHSP is to define the hazards which may be present and identify the procedures which will be followed to protect all project personnel from those hazards. This SSHSP shall also apply to all subcontractors of STOLLER who are participating in the field activities at OU7. This SSHSP addresses the requirements for personnel managing, monitoring, and performing activities associated with the RFI/RI at OU7. STOLLER and STOLLER-subcontractor personnel will follow this SSHSP and all RFP procedures and policies when conducting work at OU7 sites. A signature sheet will be kept to document that all site workers have read, understand, and will comply with all aspects of this plan. WALSH has been tasked the responsibility for implementing the requirements of this SSHSP and will provide health and safety briefings, field activity oversight, and will maintain appropriate health and safety records.

1.2 Regulations and Guidelines

Adherence to applicable federal, local, and national consensus organization health and safety standards, regulations, and guidance manuals is required during field activities at OU7. These include, but may not be limited to, the following:

- 29 CFR 1910, Occupational Safety and Health Standards, General Industry (latest edition);

- 29 CFR 1926, Occupational Safety and Health Standards, Construction Industry (latest edition);
- Nuclear Regulatory Commission 10 CFR 20 (latest edition);
- Department of Energy (DOE) Order 5480.11 (with revisions);
- Radiological Operating Instructions (ROI), EG&G Rocky Flats, Inc. (with revisions);
- Environmental Management Radiological Guidelines (EMRG) Manual, EG&G Rocky Flats, Inc. (with revisions);
- Health and Safety Practices Manual (HSPM), EG&G Rocky Flats, Inc. (with revisions);
- Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition);
- Occupational Safety and Health Guidance for Hazardous Waste Site Activities, U.S. Department of Health and Human Services et al., October 1985.
- Radiological Control Manual, DOE, June, 1992.

1.3 Contents of Plan

This SSHSP describes known hazardous materials and work operations associated with the RFI/RI activities at OU7. The plan specifies responsibilities and authorities of STOLLER and STOLLER-subcontractor personnel involved in the supervision of activities at this site. This plan further describes the requirements for medical surveillance, personal protective equipment (PPE), hazard communication, training, monitoring, decontamination, site control, and emergency response procedures.

The potential hazards associated with Phase I RFI/RI activities at OU7 sites have been assessed by reviewing historical activities and previously performed studies at the Individual Hazardous Substance Sites (IHSSs) within OU7. Based on the hazard assessment, plans for PPE, monitoring, decontamination, site control, and emergency response have been developed.

1.4 Background

A comprehensive, phased program of site characterization, remedial investigations, feasibility studies, and remedial/corrective actions is in progress at RFP. These investigations are being conducted pursuant to the 1986 Compliance Agreement between DOE, the U.S. Environmental Protection Agency (EPA), and the Colorado Department of Health, which addresses hazardous and radioactive mixed waste management at the plant. The Phase I RFI/RI at OU7 is part of the RI phase of this program.

Two IHSSs have been identified at OU7. The Present Landfill (IHSS 114) encompasses an Inactive Waste Storage Area site (IHSS 203) and thus these IHSSs are grouped together in the designation of OU7. In addition to the two IHSS areas, the East Landfill Pond area and Spray Evaporation Areas adjacent to the pond are also included in OU7.

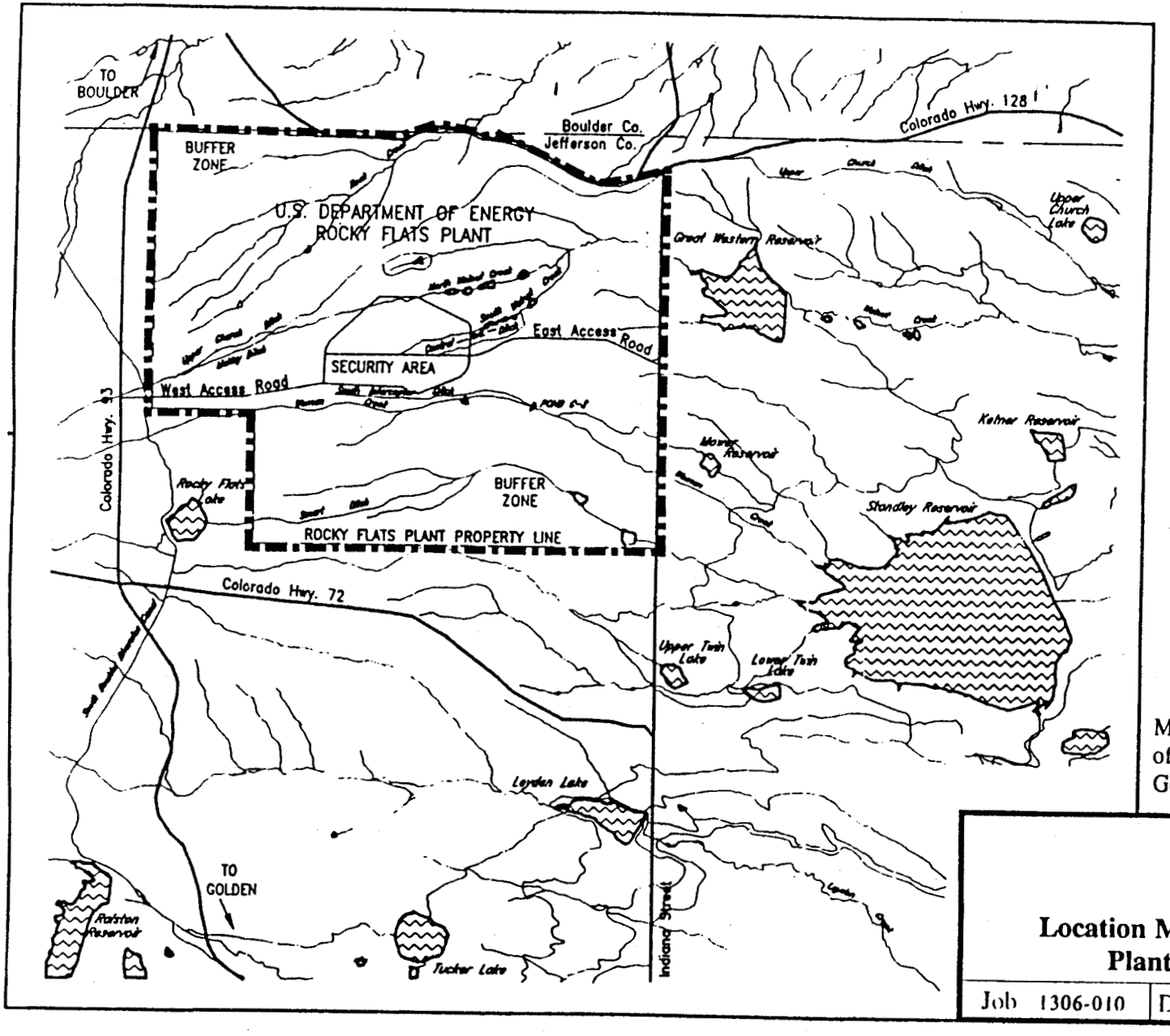
1.5 Locations and Descriptions

OU7 is located north of the plant complex on the western end of an unnamed tributary of North Walnut Creek (Figure 1.0). Figure 2.0 illustrates the location of OU7 along with the Present Landfill (IHSS 114), the Inactive Waste Storage Area site (IHSS 203), and East Landfill Pond area sites identified in the OU7 Phase I RFI/RI Work Plan (DOE, 1991). The following descriptions of the Present Landfill, the Inactive Waste Storage Area site, and the East Landfill Pond area are summarized from the OU7 Phase I RFI/RI Work Plan (DOE, 1991).

1.5.1 Present Landfill (IHSS 114)

The Present Landfill is located northwest of the plant complex on the western end of an unnamed tributary of North Walnut Creek (Figure 2.0). The landfill began operation on 14 August 1968 and was originally intended for disposal of the plant's nonradioactive solid wastes which included paper, rags, floor sweepings, cartons, mixed garbage and rubbish, demolition materials, and miscellaneous items. The landfill has expanded from a volume of 95,000 cubic yards in 1974 to 255,000 cubic yards in 1986. The volume of materials in the landfill is currently estimated at 405,000 cubic yards. Tritium was detected in the leachate water draining the landfill in September of 1973 and in response, a sampling program was initiated to determine the tritium source, monitor the waste prior to burial, and establish interim response measures to control the generation and migration of the landfill leachate.

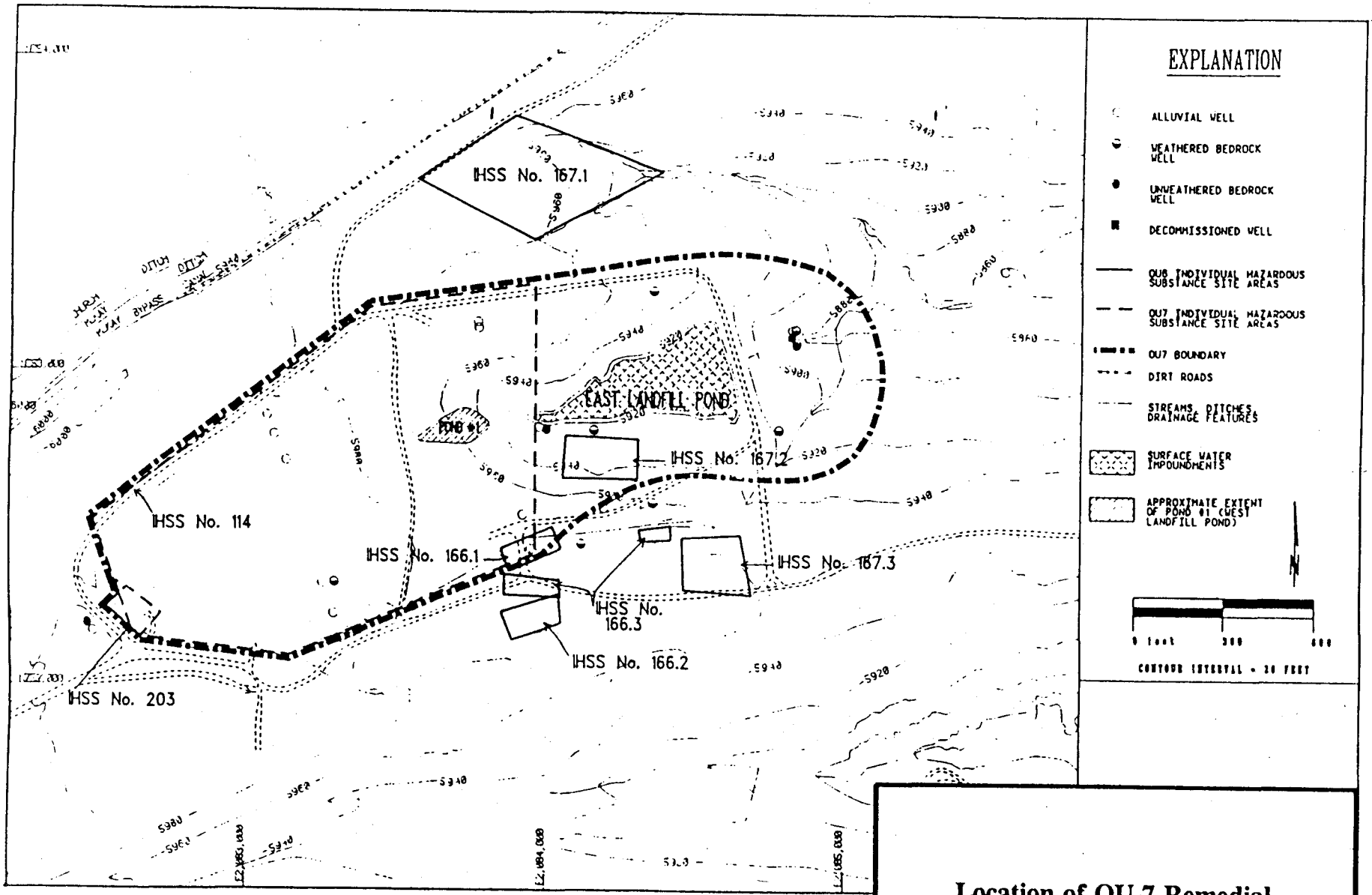
The interim response measures involved the construction of two ponds immediately east of the landfill, a subsurface ground-water interception system around the landfill, a subsurface leachate collection system, and surface water control ditches. The two ponds constructed east of the landfill were identified as the West Landfill Pond (Pond No. 1) and the East Landfill Pond (Pond No. 2). Each pond had a surface area of approximately 0.5 acres. The purpose of Pond No. 1 was to impound leachate generated by the landfill. The purpose of Pond No. 2 was to intercept and collect water flowing from the ground-water diversion system. The leachate collection system only drained into Pond No. 1, whereas the water intercepted by the ground-water diversion system could be directed to Ponds No. 1 and No. 2 and surface drainages downgradient of Pond No. 2 through a series of valves in a subsurface pipe system.



Map Source: U.S. DEPARTMENT of ENERGY Rocky Flats Plant, Golden, Colorado

Location Map of Rocky Flats Plant and Vicinity

Job 1306-010	Date 10/92	Figure 1



Map Source: U.S. DEPARTMENT of ENERGY Rocky Flats Plant, Golden, Colorado

Location of OU-7 Remedial Investigation Areas

Job 1306-010	Date 10/92	Figure 2

Waste disposal procedures have not changed significantly since the landfill began operation in 1968. Waste is delivered throughout the morning and early afternoon and is spread across the work area in mid-afternoon. After the waste is spread radiation measurements are taken with a Field Instrument for Detection of Low Energy Radiation (FIDLER) probe and radioactive items are removed and stored on-site. Subsequent to radiation monitoring, the waste layer is compacted and covered with about 6 inches of soil from on-site stockpiles. Waste disposal continues in this manner until the level of the pile is within 3 feet of the final elevation. The pile is then covered with approximately 3 feet of compacted soil. Visual observations of the landfill indicate that some areas may not have received the full 3 feet of compacted soil.

1.5.2. East Landfill Pond and Spray Evaporation Areas

An engineered pond embankment was constructed in 1974 to replace the temporary embankment of Pond No. 2. The embankment was constructed with a low-permeability clay core that was keyed into bedrock. This embankment defines the western boundary of the current East Landfill Pond which has a surface area of approximately 2.5 acres.

Water collected in the ponds is periodically sprayed onto the ground surfaces adjacent to the landfill to prevent the two ponds from overfilling and discharging water into the drainage. Water spraying and evaporation historically occurred in IHSSs designated and included in OU6, but currently water from the East Landfill Pond is sprayed along the banks of the East Landfill Pond in areas not presently designated as IHSSs. These areas are considered part of OU7.

Portions of the leachate and ground-water diversion system were buried during landfill expansion between 1977 and 1981. Eastward landfill expansion covered the discharge points of the leachate collection system into Pond No. 1, the west embankment of Pond No. 1, and finally the entire extent of Pond No. 1. Two slurry walls were constructed and tied into the north and south arms of the ground-water diversion system in 1982 to prevent ground-water migration into the expanded landfill area.

1.5.3. Inactive Hazardous Waste Storage Area (IHSS 203)

The Inactive Hazardous Waste Storage Area is located at the southwest corner of the Present Landfill (Figure 2.0). This area was used between 1986 and 1987 as a storage area for drummed liquids and solids. Fifty-five gallon drums with free liquids were stored in 14 cargo containers. One additional container was used to store spill control items such as oil sorbent and sorbent pillows. At the maximum inventory the area consisted of eight 20-foot and six 40-foot cargo containers. Fifty-five gallon drums were the largest containers stored in the cargo containers. The 20-foot cargo containers held up to 18 55-gallon drums and the

40-foot cargo containers held up to 40 55-gallon drums. The total liquid storage capacity for the 14 cargo containers was 21,120 gallons. Drummed solids were stored outside the cargo containers on the ground surface. The complete inventory of liquid and solid wastes is unknown but it is assumed that small spills may have occurred as wastes were transferred between drums during consolidation.

The cargo containers have been modified to meet the requirements for secondary containment in accordance with 6 CCR 1007-3 Section 264.175. Containers were fitted with signs, air vents, electrical grounding, and locks. A catch basin constructed of 11-gauge steel with a welded steel rim and a minimum height of 6 inches was placed in each cargo container to contain spills. The basins were designed to contain at least 10 percent of the total volume of hazardous waste in the cargo container.

RCRA wastes were stored in 12 of the 14 cargo containers and included solvents, coolants, machining wastes, cuttings, lubricating oils, organics, and acids. No information was available regarding the separation of waste types between the individual cargo containers. Two of the 20-foot cargo containers were used to store polychlorinated biphenyl (PCB) contaminated soil and debris as well as PCB-contaminated oil from transformers taken out of service. All cargo containers were removed from IHSS 203 in May of 1987 and hazardous materials are no longer stored on the site. Presently, drilling and monitoring well construction materials are stored in IHSS 203.

2.0 HEALTH AND SAFETY RESPONSIBILITIES

2.1 Introduction

Health and safety is the responsibility of all contractors working on the site. WALSH has been tasked to prepare the SSHSP, training, and health and safety oversight. The prime contractor, STOLLER, has provided a strong commitment to ensuring a safe work environment for all workers on the project. Individual project personnel responsibilities are identified in the following sections.

2.2 Assignment of Responsibilities

2.2.1 STOLLER Project Manager (STOLLER-PM)

The STOLLER-PM for OU7 has overall responsibility for work performed by STOLLER and STOLLER-subcontractors at the site. The STOLLER-PM, through line management and supervisors, has responsibility for implementing and abiding by the SSHSP. The STOLLER-PM has assigned a Field Implementation Manager (FIM) to coordinate off-site and on-site activities. The STOLLER-PM has appointed a WALSH employee to serve as the Health and Safety Officer (HSO). STOLLER-subcontractors will review and comply with this SSHSP prior to initiating work at the site.

2.2.2 STOLLER Site Manager/Field Operations Lead (SM/FOL)

The STOLLER SM/FOL for OU7 has responsibility for day-to-day management of field work performed by STOLLER and STOLLER-subcontractors. The SM/FOL, in coordination with line management, has responsibility for ensuring that qualified personnel are assigned to perform field activities in a manner consistent with the SSHSP. The SM/FOL, with support from the health and safety-related disciplines, will assist the WALSH HSO in coordinating the implementation of the SSHSP.

2.2.3 WALSH Health and Safety Officer (HSO)

The WALSH HSO is responsible for developing and implementing the SSHSP that adequately addresses the site hazards and controls necessary to safeguard personnel and property. Duties of the subcontractor HSO include the following:

- Providing requisite physical examinations requirements to STOLLER employees working at hazardous waste sites;
- Correlating exposure data to ensure that the scope of annual physical examinations are correct;

- Informing employees of potential exposures to hazardous materials based on bioassays.
- Ensuring that personnel are adequately trained so that they can safely perform their assigned tasks;
- Ensuring that personnel are aware of potential site hazards, and that they know the necessary controls to prevent overexposure or injury by conducting site-specific briefings;
- Appointing alternate HSO(s);
- Ensuring that the SSHSP and the required training and medical records for site personnel are current and are maintained on site;
- Ensuring that all personnel have read and signed the SSHSP. A copy of the signed SSHSP must be kept in the work trailer;
- Conducting the required monitoring or assuring that monitoring is conducted by the assigned personnel;
- Coordinating with the SM/FOL regarding the need for additional safety support required at OU7;
- Performing audits of subcontractor health and safety operations; and
- Approving modified work practices in response to changing conditions at OU7.
- Document control and destribution of any revisions to the SSHSP.

2.2.4 WALSH Health and Safety Technicians (HSTs)

The WALSH HSO for OU7 has the responsibility for assigning HSTs to provide oversight and monitoring of field operations. The key responsibilities of the HSTs are:

- Monitoring the project to ensure that the requirements of this SSHSP are implemented;
- Alerting the STOLLER-SM/FOL and the HSO of health and safety violations;
- Performing tests to minimize the potential for exposure of field personnel and verify that equipment leaving the radiologically controlled areas (RCAs) or areas of suspected/potential soil contamination is in compliance with applicable regulations and standard operating procedures;
- Monitoring soil surfaces and soil cuttings and will perform decontamination verification by frisking and smear testing;
- Ensuring that field crews are in compliance with EG&G Radiation Work Permits;
- Performing duties in accordance with the EG&G EMRGs with the approval of EG&G Radiological Engineering.

2.2.5 Field Team Leaders (FTLs)

The FTLs are responsible for implementing and abiding to the SSHSP and ensuring that all site workers have reviewed and will comply with the requirements of the SSHSP. Examples of the FTLs include the Mobile Laboratory Manager, the Well Installation Manager, the Soil Sampling Manager, Ground-Water Sampling Manager, the Surface Water Sampling Manager, and the Cone Penetrometer Tester.

2.2.6 Fire Protection Representative

The fire potential during environmental investigations does not justify the cost of providing an independent Fire Protection Representative. Fire prevention is expected to be largely a matter of good housekeeping. In the event of a fire, EG&G Fire Department will be notified and STOLLER personnel will withdraw from the area. Should any personnel sustain injury, RFP Emergency Medical Services will be immediately notified. The EG&G emergency number is 966-2911.

2.2.7 Radiation Protection Technologists (RPTs)

EG&G approved personnel and equipment will be provided to survey the project area and clear decontaminated equipment of radiological hazards. A project RPT will be assigned to oversee all radiation monitoring performed on this project. The RPT will conform to the education and experience requirements written in DOE Order 5480.11. In addition, two qualified RPT's-In-Training (PRT's-IT) will be trained to perform daily routine monitoring of personnel and equipment decontamination under the supervision of the RPT. Formal training for the RPT's-IT will conform to the DOE Order 5480.11 training requirements.

2.3 STOLLER OU7 Personnel

Project Title	Name (Company)	Phone
PM	Greg Davis (STOLLER)	(303) 449-7220
FIM	Kathy Tegtmeyer (STOLLER)	(303) 449-7220
SM/FOL	Myra Vaag (STOLLER)	(303) 449-7220
HSO	Dave Gerow, CIH, CSP (WALSH)	(303) 443-3282
Alternate HSO	John Murray (WALSH)	(303) 443-3282
HST	Harvey Johnson (WALSH)	(303) 443-3282
HST	Virgil Palencia (WALSH)	(303) 443-3282

2.4 EG&G Personnel

	Name	Extension
RAD Engineering	K.D. Anderson	X 5151
Industrial Safety	G.W. Beers	X 3149
RAD Operations	D.J. Davidson	X 5772
Industrial Hygiene/Site Health and Safety Coordinator	B.P. Fielding	X 5471
Occupational Health	F.J. Furmar	X 2895
Environmental Management	T.P. O'Rourke	X 8577
Fire Protection	T.J. Parker	X 6043
Health and Safety Administrator	P.A. Stephens	X 4831
Health and Safety Liasion Officer	L.A. LeLievre	X 7691

3.0 HAZARD ASSESSMENT

3.1 Introduction

The field work that will be conducted at OU7 includes potential chemical, radiological, physical, biological, and mechanical hazards. These potential hazards were identified by reviewing site histories, previous sampling results, and work plans for the operable unit. The Phase I RFI/RI is designed to provide additional information concerning potential hazards associated with each IHSS; therefore, it is not possible to identify all chemical and radiological hazards associated with field work at the present time. The use of standard measures such as PPE, worksite chemical and radiological monitoring, work practice controls, and training should assist in identifying, evaluating, and controlling potential hazards at the work site that are not currently known.

Based on available information about the site, most of the work will be conducted in areas where severity of potential hazards is expected to be low. The potential for encountering chemical or radiological hazards will depend on each IHSS, what types of compounds were disposed at the site, and what work is being performed. Environmental physical and biological hazards, such as insects, heat and cold stress, and noise, will likely be encountered to some degree while working in the IHSS. The degree of mechanical hazards resulting from motor vehicle or boat operation, use of heavy equipment, power tools, etc., will also depend on the work being performed. A summary of site activities, hazards, monitoring requirements, and control methods for OU7 is presented in Table 3-2. The rational for monitoring and PPE are presented in Sections 9.0 and 6.0, respectively.

RI activities at OU7 will involve the following operations:

- Non-intrusive operations such as assisting in radiological surveys, overviewing geophysical testing and performing visual inspections. These operations do not disturb the soil and are not expected to approach occupational exposure limits.
- Intrusive operations such as soil gas surveys, sampling surface and subsurface soils, installation of monitoring wells, cone penetrometer tests and BAT sampler installations. These operations disturb soil and have the potential to resuspend contaminated subsurface soils. The quantities of spoils produced is small. Dust generation will be minimized by misting soils with water and by shoveling the spoils into containers periodically. The Plan for the Prevention of Contaminant Dispersion (PPCD) developed by EG&G will address dust emissions and will be complied with by STOLLER.

3.2 Potential Chemical and Radiological Hazards

3.2.1 Pathways and Exposure Routes

Pathways of exposure to chemical and radiological hazards are directly dependent upon investigative activities performed at OU7. Exposure to potential health hazards may occur during activities involving soil gas surveys, surface and subsurface soil sampling, drilling activities, groundwater sampling and measurement efforts, and other intrusive activities. Exposure pathways include the following:

- Inhalation of volatile organic compounds (VOCs), fugitive dust containing metals, and fugitive dust contaminated with radionuclides;
- Skin absorption or contact with VOCs, or other chemical compounds that may be absorbed through the skin;
- Inadvertent ingestion of low-volatility organic chemicals absorbed to dust particles or fugitive dust contaminated with metals and/or radionuclides; and
- Injection of radionuclides, metals, or other chemical compounds into the body through the skin.

3.2.2 Chemical Hazards

3.2.2.1 Airborne Exposures to Volatile Organic Compounds (VOCs)

Varying concentration levels of VOCs may exist at sites within OU7. Previous dumping or spill sites of VOCs where contamination has not been removed will likely have the highest potential for exposure. Exposure may occur during intrusive activities (i.e., soil gas surveys, soil sampling, borehole installation, monitoring well and piezometer installation, or excavation), which can release VOCs into the worker's breathing zone. Periodic air monitoring, work practice controls, and the use of respiratory protection will be used as the primary evaluation and control methods to prevent exposure to airborne VOCs.

3.2.2.2 Skin Exposures to Volatile Organic Compounds (VOCs)

The presence of VOCs at sites in OU7 could lead to dermal exposures to workers. Dermal exposure could lead to local skin irritation or absorption into the body through the skin. Contamination avoidance and proper use of PPE (clothing and gloves) will be the primary control measures used to prevent skin exposure. Coveralls will be worn at all times as a minimum PPE requirement. All field personnel will be required to take a shower at the end of each work shift.

3.2.2.3 Inadvertent Ingestion of Contaminants

The potential exists for workers to be exposed to hazardous chemical compounds through inadvertent ingestion. This exposure route is considered to be remote if site workers follow good personal hygiene measures prior to eating, drinking, or smoking. Eating and drinking are only allowed in the designated support zone.

3.2.2.4 Asbestos

Asbestos containing wastes were disposed of in the present landfill in identified asbestos pits. EG&G will identify the location of these pits and field activities will be directed to avoid drilling in these areas.

3.2.3 Radiological Hazards

3.2.3.1 Airborne Exposures to Radiological Hazards

Exposure to radiological hazards could occur through inhalation of fugitive dust contaminated with radiological materials. The degree of potential exposure to airborne radiological hazards is considered unlikely or low depending on the individual work site and amount of airborne dust created at the site. Most all work sites reportedly have low or below background levels of radionuclides and the intrusive activities to be performed usually generate low quantities of airborne dust. Unknown radiological contamination at the site (e.g., buried contaminated material in the landfill) could lead to unexpected generation of airborne radiological hazards. The use of initial site surveys, air monitoring, work practice controls (e.g., minimizing dust generation), dust control practices, and proper use of PPE and respirators will be the primary evaluation and control measures used to prevent inhalation of radioactive materials.

3.2.3.2 Skin Exposures to Radiological Hazards

Radioactive materials identified at sites in OU7 are not readily absorbed through the unbroken skin. Contamination avoidance, decontamination, and proper use of protective clothing and gloves will be the primary control methods used to prevent skin contamination.

3.2.3.3 Inadvertent Ingestion of Radionuclides

Ingestion of radionuclides is possible during OU7 site work. The potential for exposure via this pathway is considered to be remote if good personal hygiene practices are followed prior to eating, drinking, or smoking. No eating, drinking, smoking or chewing of tobacco, or

chewing gum will be allowed in the contamination reduction zone (CRZ) or the exclusion zone (EZ).

3.2.3.4 Puncture Wounds

Radiological materials could enter the body through breaks in the skin caused by a cut, laceration, puncture, abrasion, or burn. This route of entry can be controlled by complying with safe work practices to prevent accidents. If accidents occur possibly leading to radiation exposure, ROI 2.3 or EMRG 2.3 procedure will be implemented.

3.2.4 Metals Contamination Hazards

3.2.4.1 Pathways and Exposure Routes

The concentration of metals throughout OU7 will be more fully evaluated during the RFI/RI. Normal background levels have not yet been established. However, some metals have been detected above the contract required quantitation limit (CRQL), the quantitation limit set forth in the EPA's Contract Laboratory Program, and may pose a health hazard depending on the metal present and the concentration. Refer to Table 9-2 for Contaminants of Concern (COC).

3.2.4.2 Inhalation or Ingestion Exposure to Fugitive Dust Contaminated with Metals

Workers could be exposed through inhalation or inadvertent ingestion of fugitive dust contaminated with metals during intrusive activities. These activities, along with weather conditions, could cause dust entrainment into the air and subsequently into the workers' breathing zone. Metals can be ingested into the body by poor personal hygiene practices prior to eating, drinking, or smoking.

The degree of potential exposure from contact with metal contaminants during investigation activities in OU7 is believed unlikely or low, depending on the work activity and individual work location. The use of air monitoring, work practice controls (e.g., minimizing dust generation and personal hygiene), and proper use of PPE and respirators will be used as the primary evaluation and control methods to prevent inhalation or ingestion of metals.

3.3 Physical Hazards

Workers at sites within OU7 are potentially subjected to physical stresses, including heat and cold stress and noise exposure. Investigative activities may take place during a wide range of weather conditions leading to possible heat or cold stress conditions. Unacclimatized workers or workers wearing impermeable personal protective clothing during warm weather

may be susceptible to heat stress. The "buddy" system will be used and all personnel shall be aware of the signs and symptoms of heat/cold stress on themselves or their "buddy". High noise exposure is possible when operating power tools and mechanized equipment.

3.3.1 Cold Exposure

When working outdoors in temperatures below freezing, workers are susceptible to frostbite. Exposure to extreme cold can cause severe injury to the body surface or can result in profound generalized cooling, causing death. In cold weather, precautions should be taken to prevent cold exposure by wearing properly insulated garments and taking warm-up breaks in temperature controlled areas when necessary. Symptoms of cold exposure include the following:

- Incipient frostbite or frost nip, characterized by sudden blanching or whitening of the skin.
- Superficial frostbite, which causes the skin to become waxy or white and superficially firm, but resilient beneath.
- Deep frostbite, characterized by cold, pale, solid skin tissues.
- Systemic hypothermia, caused by exposure to freezing or rapidly dropping temperature. Symptoms are usually exhibited in stages. These include shivering, apathy, listlessness, sleepiness, rapid cooling of the body temperature to less than 95° Fahrenheit (° F), unconsciousness, glassy stare, slow pulse and slow respiratory rate, freezing of the extremities, and death.

3.3.2 Heat Stress

A worker's risk for developing heat stress is greatly increased when wearing impermeable, personal protection clothing. This type of clothing limits the body's normal heat exchange mechanisms and increases energy expenditure. A program to recognize potential heat stress situations, prevent episodes, and control hazards will be implemented where necessary. The program would include heat stress monitoring, adequate rest breaks, fluid replacement, acclimatization, and personal cooling systems. Heat stress can cause health effects that range from heat fatigue to serious illness or death. Signs and symptoms of heat stress include the following:

- Heat rash, which may result from continuous exposure to heat or humid air.
- Heat cramps, caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include muscle spasms, or pain in hands, feet or abdomen.
- Heat exhaustion, which occurs from increased stress on various body organs or systems, including inadequate blood circulation due to cardiovascular system

inefficiency or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; or fainting.

Personnel having symptoms of heat exhaustion will be immediately removed from field work. Protective equipment will be removed and vital signs monitored. If body temperature exceeds 101° F the individual will be transported to the medical facility for evaluation.

Heat stroke is the most serious form of heat stress. The body's temperature regulation system fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Signs and symptoms of heat stroke are red, hot, usually dry skin; reduced or lack of perspiration; nausea; dizziness and confusion; strong, rapid pulse; or coma. The body temperature often exceeds 102° F.

If signs of heat stroke are detected, the emergency should be immediately reported by calling 2911. The individual's protective clothing will be removed and they will be cooled by flushing with water that is close to body temperature. The individual will be transported for further evaluation/treatment to the medical facility determined by the responding Emergency Medical Technicians. Appendix B provides additional guidance for the prevention, monitoring, and treatment of heat stress.

3.3.3 Noise Exposure

Workers may be exposed to high noise levels during investigative activities at OU7, primarily from drill rigs and other mechanized equipment in use at the site. Noise exposure will be controlled to levels below those stipulated in Table 3-1, or adequate hearing protection will be required for exposed personnel. Employees exposed to noise levels in excess of levels shown in Table 3-1 will participate in the WALSH Hearing Conservation Program.

3.3.4 Explosive Hazards

Methane gas may be released from landfill locations during intrusive activities. If allowed to accumulate, methane poses an explosive hazard. Airborne combustible gas measurements will be taken in the breathing zone of workers and action taken according to Table 9-1. Existing gas venting wells mitigate accumulation of methane and therefore reduce the potential explosion hazard.

3.3.5 Drill Rig Operations

The following paragraphs describe the hazards associated with operation of drill rigs. Although WALSH personnel will not be operating drill rigs, it is necessary that those

TABLE 3-1
TLVs FOR NOISE[1]

Duration per Day (Hours)	Sound Level dBA[2]
16	80
8	85
4	90
2	95
1	100
1/2	105
1/4	110
1/8	115[3]

1 From "Threshold Limit Values and Biological Exposure Indices for 1990-1991," ACGIH, Cincinnati, Ohio.

2 Sound levels in decibels (dBA) are measured on a sound meter, conforming as a minimum to the requirements of the American National Standards Institute (ANSI) Specification for Sound Level Meters, S1.4 (1971 Type S2A, and set to use the A-weighted network with slow meter response).

3 No exposure to continuous or intermittent noise in excess of 115 dBA.

personnel who will be performing other activities in the proximity of a drill rig be aware of the hazards associated with drilling operations. The WALSH-subcontractor providing drilling services will prepare a health and safety plan governing the activities of its employees.

Drill Rig Maintenance/Condition

Drill rig maintenance is the responsibility of the STOLLER-subcontractor. STOLLER-subcontractors must only use equipment which complies with manufacturers safety and maintenance requirements. WALSH personnel will perform a detailed visual inspection to determine that:

- cables are not seriously frayed;
- hydraulic lines are not leaking; and
- auger guides are present on rigs designed to use them.

WALSH will also require the driller/driller's helper (drillers) to demonstrate that:

- all the kill switch(es) are operational (must be painted red per 29 CFR 1910.144 (a) (i) (iii)); and
- the back-up warning device is operational.

Equipment which does not meet the above requirements are deemed to be unsafe and are not approved for use on WALSH projects. If other items appear to be a hazard, they will be brought to the attention of the drillers for assessment. The notification will be documented in the logbook along with actions taken (including no action).

Special Considerations

The STOLLER Well Installation Manager is responsible for examining the rig to determine if grease, oil or other materials, commonly used for drilling, may interfere with the environmental analyses which are to be performed on collected samples. Special greases made from vegetable fat may be required in some instances.

HAZARDS ASSOCIATED WITH DRILL RIG OPERATIONS

Underground Hazards

Prior to initiating drilling operations, STOLLER will clear borehole locations in accordance with EG&G Standard Operating Procedure (SOP) GT.10.

Fire and explosion hazards may be present if containerized chemicals are present underground (geophysical testing will be performed if there is doubt about the presence or location of underground structures or containers). No drilling is permitted in areas where explosion potential exists (i.e. metal masses have been detected using geophysical methods).

If there is potential for drums to be buried more than 8 feet below the surface, periodic down-hole tests will be required to prevent drilling into metallic containers.

Clothing

Loose-fitting or bulky clothing should not be used in the immediate vicinity of the rotating auger. The auger can snag the clothing and pull the operator into the rig.

Grout

Grouts often use volclay or other materials containing crystalline silica. Drillers are expected to use respiratory protection while mixing grout unless the drilling company has documentation which indicates that crystalline silica concentrations do not exceed .05 mg/m^3 as an 8-hr time-weighted average (TWA). The National Institute of Occupational Safety and Health (NIOSH) lists crystalline silica as a carcinogen and recommends that exposures be kept as low as practical.

Lightning

Drill rigs act as a lightning rod. If lightning is seen anywhere on the horizon, drilling operations will be discontinued.

Noise

Noise may be in excess of the levels set by OSHA during certain operations such as driving a split spoon. Noise monitoring will be conducted determine if noise levels exceed action levels of 85 dBA continuous or 140 dBA impulse. Hearing protection is required to be worn when noise levels exceed 85 dBA. Ear plugs and ear muffs will be worn when impulse noise exceeds 140 dBA impulse.

If the noise levels are not documented to be below 85 dBA during normal operations and 140 dBA during hammering operations, noise levels will be assumed to exceed acceptable levels. Ear muffs or foam ear plugs will be worn during normal drilling and a combination of ear plugs and ear muffs during hammering operations. Hammering operations include split spoon sampling.

Extra effort should be used to remain aware of heavy machinery operations when working with hearing protection, since verbal warnings will be harder to hear.

Overhead Hazards

Minimum clearances are required when working near energized power lines:

- 10 feet from a 50 KV or less line
- 20 feet from a 50 KV to 345 KV line and
- 34 feet from a 345 KV to 750 KV line

When working near buildings, branches, bridges, etcetera, the drill rig needs to have enough room for the mast to be raised safely. The minimum safe radius is equal to the maximum mast height plus at least 5 feet. If buildings or pipes are directly overhead, additional height may be required to provide safe clearance while raising A-rods and augers above the mast height. The team leader should coordinate with the drilling company to determine the clearance requirements for the specific rigs to be used.

Rain

Rain on the cathead makes the cathead slippery and dangerous. Outdoor operation of catheads is not permitted in rain.

Wind

If sustained winds reach 30 miles per hour (mph), all materials and/or debris will be secured. Drilling will continue if determined safe by EG&G health and safety personnel. If sustained winds reach speeds at or above 45 mph, drilling activities will be discontinued until winds calm.

Slippery Surfaces

Slippery surfaces may be present in the immediate vicinity of the auger. The slippery surfaces are due to clay-like particulates which have been wet by ground water and/or rainwater. Mesh stages on drill rigs which can reduce the slip hazards substantially will be used.

Volatile Chemical Hazards

If there is potential for volatile chemicals, monitoring must be performed as specified in the site specific safety plan. Breathing zone measurements will be used to determine the

required level of respiratory protection. Down hole and soil surface measurements will be used to provide advanced warning that concentrations may increase in the breathing zone.

Non-Volatile Chemical Hazards

Non-volatile chemical hazards will be conservatively estimated using real time instruments, or assumed to be present, for the purposes of selecting PPE. Non-volatile chemicals include heavy metals, PCBs, pesticides, etc.

If the non-volatile chemical concentration exceeds one-half of the occupational exposure limit, industrial hygiene sampling will be required to determine the actual concentration present.

Exclusion Zone (EZ)

Personnel are not authorized to enter the EZ unless their job requires them to be present and they meet or exceed the requirements specified in the site-specific safety plan for medical monitoring, training, and personal protection.

The EZ for drilling rig operations has three components: the area of chemical hazards, the area near moving parts, and the area where cables and augers are being moved. As a minimum, the EZ extends to a radius equal to the length of the extended mast, plus the length that rods, or augers extend beyond the mast.

All unessential personnel should be excluded from areas where high levels of contamination exist and/or PPE is required.

All personnel except the driller and the driller's helper should be excluded from a four foot (4 foot) radius of the rotating auger. Safety personnel and geologists are permitted to enter the four foot radius only after the auger has stopped rotating.

All personnel except the driller and the driller's helper should be excluded from the area behind the rig where augers are "run-out" and placed on the ground or on devices which keep the augers off the ground.

Procedures

- No drilling is permitted until utility locators (or testing) have determined that utilities are not located in the area to be penetrated.

- Drilling is not permitted in areas having buried drums or tanks until geophysical testing has confirmed that they are absent in the area to be drilled. Procedures are available to extend the depth of detection.
- Drill rigs with inoperable or disabled safety equipment will not be used.
- Only experienced drill rig operators are authorized to operate the drill rig.
- No one but the drillers should be within 4 feet of the rotating auger.
- When motorized soil boring and well construction activities are underway, the interior of the auger(s) will be monitored each time the auger is opened to add another auger flight. A PID measurement greater than background inside the auger will be cause to initiate PID measurements in the breathing zone of the individual most likely to be exposed, such as the driller or the driller's helper. Results of breaching zone measurements will be compared to the action limits listed in Table 9-1.
- The drilling crew is responsible for maintaining the drill rig and stopping work if unsafe conditions develop.
- The EZ will include the area immediately behind the rig. This area is used by drillers to "run-out" auger flights as they are being added or removed from the rig.

Safety Officer Responsibilities

The WALSH HSO is responsible for ensuring:

- The drilling crew demonstrates to the field team that the kill switch(s) is functional, and shows its location. No drilling is to be permitted if the kill switch is not operational, or if **all members** of the field crew are not familiar with its location and operation.
- That auger guides are used where applicable.
- That the PPE specified in the safety plan is used.
- A minimum of two persons are present at the drill rig at all times of operation.
- That First Aid/cardio-pulmonary resuscitation (CPR) is immediately available during periods of drill rig operation.
- Respiratory protection is worn when conditions warrant it. PPE impairs the operator's vision. Gloves and other safety equipment can make "normal operations" more difficult to perform. Unnecessary use of respiratory equipment should not be required. If a driller feels more comfortable using respiratory protection to reduce exposures that will not exceed the published exposure levels, he must be aware of the increased physical hazards.
- At least 5 feet of clearance is maintained on all sides of the drill rig for emergency egress.

- That equipment is decontaminated according to procedures outlined in the EMRG and that at least 50 percent of equipment leaving a potentially contaminated area is surveyed according to the EMRG before being released from the site.
- Handling radiological deficiency reports and processing them through Radiological Engineering (see Appendix D).
- Maintaining radiation work permit (see Appendix D).

Personal Protective Equipment (PPE)

PPE will include:

- hard hat
- respiratory protection as needed
- eye protection such as safety glasses with side shields or goggles (if full face respirator not used)
- hearing protection
- company coveralls (cotton, Tyvek or Saranex)
- safety boots
- gloves

Monitoring

- Noise
- Chemical Contaminants
- Radioactive Contaminants

Decontamination

Decontamination of all drilling equipment will be performed in accordance with EG&G SOPs FO.09, FO.10, FO.11, and FO.18. All WALSH and WALSH-subcontractor personnel performing decontamination at the Main Decontamination Facility will receive documented training in the use of this facility.

3.4 Biological Hazards

Biological hazards that may be present at RFP include plants, insects, and snakes. Considerations for potential biological hazards may be necessary when workers are required to enter remote or seldom-visited locations.

The potential for contact with snakes or insects that may cause injury or disease exists when performing investigative activities at RFP. The RFP does not host any plants that are

poisonous to humans, other than poison ivy. There are some plants that may be mechanically injurious (i.e., thorns). Field personnel will wear sturdy work clothes and shoes in order to help prevent injuries.

There is one type of venomous snake present in the RFP area, the prairie rattlesnake. Personnel should be aware that snakes may be present in the area and exercise caution, especially when working in previously undisturbed areas and locations with animal dens.

Black widow spiders and scorpions may be present on site. They are usually found in shady places or under rocks or wood. The black widow spider has a shiny black body about the size of a pea, with a red or yellow hourglass-shaped mark on its abdomen. It weaves shapeless webs in undisturbed areas. A bite may result in severe pain, illness, and possibly death from complications, but usually not from the bite itself. There are several types of scorpions native to Colorado. Scorpions may be brown to yellowish in color, and range from 1/2 inch to 8 inches in length. Their bodies are divided into two parts - a short, thick, upper body, and a long abdomen with a six-segmented tail. A scorpion has six pairs of jointed appendages - one pair of small pinchers, one pair of large claws, and four pairs of jointed legs. They are most active at night. A scorpion sting is very painful, but usually will not result in death.

In addition to spiders and scorpions, ticks, chiggers, bees, and wasps may be nuisances to field personnel. Bites from wood ticks may result in the transmission of Rocky Mountain Spotted Fever, a serious and possibly fatal viral disease. The Rickettsia virus infects wood ticks, mostly in the late spring and early summer, and is characterized by chills, fever, severe pain in leg muscles and joints, and a body rash. Lyme Disease is not prevalent in Colorado. Some protection will be offered by PPE, but the use of insect repellant (containing at least 30 percent DEET) on outside clothing and exposed skin also may be warranted. Personnel should perform self-searches after each day to check for ticks and chiggers. Bees or wasps can be considerable hazards for those people with allergic reactions to venom. The WALSH HSO should be notified if any worker is sensitive to these insects. Properly trained personnel will administer first aid should a bee or wasp sting occur.

3.5 Mechanical Hazards

Workers may be exposed to potential mechanical hazards during the investigative activities at OU7. Hazards and methods of hazard control may be detailed in SOPs and operation safety analyses for specific tasks performed during environmental restoration site activities. Site inspections will be conducted periodically by the WALSH HSO to assess hazards according to standard health and safety protocols.

3.6 Potential Chemical or Radiological Hazards and Control Methods Summary

Each IHSS in OU7 is discussed below. Site background summaries are compiled from existing data in the OU7 Phase 1 RFI/RI Work Plan and previous sampling reports. Potential chemical and radiological hazards listed are based only on these data or known past use of the site. The control measures listed are meant to be the minimum control measures required for initial work at the site. Additional control measures may be necessary as determined by site health and safety personnel. As additional site data become available through site monitoring or investigations, the control measures may need to be altered. The decision to alter the control measures should be made only by knowledgeable health or safety professionals responsible for site activities.

3.6.1 Present Landfill (IHSS 114)

3.6.1.1 Site Background Summary

The landfill was designed for disposal of nonradioactive solid waste and began operation in 1968. Other than testing for radioactivity, little testing was performed prior to 1986 to characterize the landfill wastes. In 1986 and 1987, waste streams were characterized under the Waste Stream Identification and Characterization Program. At that time, 97 of the 241 waste streams were identified as hazardous waste, and landfill disposal of hazardous wastes in IHSS 114 were stopped. Tritium and strontium 89 and 90 were first detected leaching from the landfill into Pond No. 1 (West Landfill Pond) in September, 1973. (Refer to Figure A-1 in Appendix A for site map.) Concentrations of these two radioactive sources appear to be decreasing with time. Borehole sampling in the landfill indicates acetone, 2-butanone, methylene chloride, toluene, and xylenes to be present above site background levels. Other VOC's have been detected in monitoring wells with the greatest frequency being trichloroethylene and its degradation products 1,1,1-trichloroethane and 1,2-dichloroethylene. Monitoring wells located in and around the landfill have recently shown inorganic analytes including nitrate/nitrite, bicarbonate, chloride, sulfate, and TDS to exceed site background levels. Dissolved radiochemical sources exceeding site background concentrations include americium-241, cesium-137, and uranium-233 and 234. A summary of the COCs at OU7 are given in Table 9-2.

3.6.1.2 Anticipated Work Activities

WALSH personnel will conduct non-intrusive activities such as project management, site inspection, air sampling, and radiation monitoring activities at the site. Personnel will also participate in intrusive activities such as soil gas surveys, subsurface soil sampling, cone penetrometer testing, and well installation. Work activities to be conducted at the site are summarized in Table 7-1, Appendix C (Phase I RFI/RI Work Plan, EG&G, 1992a).

3.6.1.3 Potential Chemical or Radiological Hazards

The primary hazards associated with environmental investigation activities within IHSS 114 are anticipated to be dermal exposure or inhalation of VOCs, metals, and radionuclides. Because the site is a landfill, intrusive activities which contact and release buried contaminated materials will have the highest potential for causing personal exposure. This potential can be controlled by implementing procedures for avoiding contact with contaminated materials (PPE and radiological and geophysical surveys) and direct reading air and radiation monitoring to detect potential worker contact with contaminated materials. Methane production and release is possible and will be monitored using a combustible gas indicator (CGI).

3.6.1.4 Control Measures

Level D protection including cotton coveralls, safety boots, eye protection, and hard hats (when overhead hazards are present) will be worn during work for all non-intrusive site activities. Leather gloves over latex inner gloves will be worn when handling dry materials to prevent cuts/abrasions. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and steel-toed chemical resistant boots will be worn during intrusive activities at the site. Monitoring for total dust and VOCs as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EG&G SOP FO.16 will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

3.6.2 East Landfill Pond and Spray Evaporation Areas

3.6.2.1 Site Background Summary

The water in the East Landfill Pond was characterized by chemical analysis in 1989. Contaminants include radionuclides, metals, VOCs, semi-volatile organic compounds (SVOCs), and inorganic analytes. Sediments have not been analyzed but are expected to contain metals, radionuclides and volatile and SVOCs.

Soils along the banks of the East Landfill Pond are currently sprayed with pond water as a way to evaporate and therefore reduce the volume of the pond. These areas are not presently designated as IHSSs but are part of OU7. Potential soil contamination in area where spray irrigation occurred consists of metals, radionuclides, and inorganic analytes detected in the East Landfill Pond. Other areas north and south of OU7 were historically spray irrigated with water from the West Landfill Pond and are incorporated into OU6. Refer to Figure A-1 in Appendix A for site locations.

3.6.2.2 Anticipated Work Activities

WALSH personnel will conduct non-intrusive activities such as project management, site inspection, air sampling, and radiation monitoring activities at the site. Personnel will also participate in intrusive activities such as water sampling, soil gas surveys, subsurface soil sampling, cone penetrometer testing, and well installation. Work activities to be conducted at the site are summarized in Table 7-1, Appendix C (Phase I RFI/RI Work Plan, EG&G, 1992a).

3.6.2.3 Potential Chemical or Radiological Hazards

The primary hazards associated with environmental contamination at this site are anticipated to be dermal exposure or inhalation of inorganic analytes, metals, or possible inhalation of radionuclides. The potential for this occurring is considered to be low based on the work activities to be performed, work practices, probable low concentration of contaminants in the soils, and known low concentration of contaminants in the groundwater.

3.6.2.4 Control Measures

Level D protection including cotton coveralls, safety boots, eye protection, and hard hats (when overhead hazards are present) will be worn during work for all non-intrusive site activities. Leather gloves over latex inner gloves will be worn when handling dry materials to prevent cuts/abrasions. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and steel-toed chemical resistant boots will be worn during intrusive activities at the site. Monitoring for total dust and VOCs as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EG&G SOP FO.16 will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

3.6.3 Inactive Hazardous Waste Storage Area (IHSS 203)

3.6.3.1 Site Background Summary

IHSS 203 is a 150 foot by 100 foot site that was used from 1986 to 1987 store liquid and solid nonradioactive hazardous wastes. The site is located in the southwest corner of the Present Landfill (IHSS 114). Materials were stored in 55-gallon barrels inside large (20 foot to 40 foot) cargo containers above ground. No reportable spills are documented although spills of less than reportable quantity may have occurred. Possible contaminants at the site are (1) metals, PCBs and radionuclides sorbed to surficial soils and (2) VOCs and SVOCs

at shallow soil depths. The presence and distribution of these contaminants is not presently known.

3.6.3.2 Anticipated Work Activities

WALSH personnel will conduct non-intrusive activities such as project management, site inspection, air sampling, and radiation monitoring activities at the site. Personnel will also participate in intrusive activities such as water sampling, soil gas surveys, subsurface soil sampling, cone penetrometer testing, and well installation. Work activities to be conducted at the site are summarized in Table 7-1, Appendix C (Phase I RFI/RI Work Plan, EG&G, 1992a).

3.6.3.3 Potential Chemical or Radiological Hazards

The primary hazards associated with environmental contamination at this site are anticipated to be dermal exposure or inhalation of inorganic analytes, metals, or possible inhalation of radionuclides. The potential for this occurring is considered to be low based on the work activities to be performed, work practices, probable low concentration of contaminants in the soils, and known low concentration of contaminants in the ground water.

3.6.3.4 Control Measures

Level D protection including cotton coveralls, safety boots, eye protection, and hard hats (when overhead hazards are present) will be worn during work for all non-intrusive site activities. Leather gloves over latex inner gloves will be worn when handling dry materials to prevent cuts/abrasions. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves, and steel-toed chemical resistant boots will be worn during intrusive activities at the site. Monitoring for total dust and VOCs as an indicator of potential chemical contamination will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EG&G SOP FO.16 will be performed during intrusive work. Decontamination procedures as discussed in Section 7.0 will be followed for general and heavy equipment. Face and hands will be washed after leaving the site and before eating, drinking, or smoking.

TABLE 3.2 OPERABLE UNIT 7 SUMMARY TABLE

Field Location (IHSS #)	Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
General (Common Hazards)	All. These hazards are presumed present at all hazardous substance sites even when activities are not present. Site activities may increase the magnitude or number of hazards.	Heat Stress Cold Stress	Core temperature, WBGT when ambient temperature is above 80° F, and pulse.	Wear adequate thermal clothing in cold temperatures.	Adjust work/rest cycles and fluid intake to maintain normal body temperature.
		Fugitive dusts which may be contaminated with heavy metals, radionuclides or chemical contaminants.	Particulate dust monitoring (miniram). See Section 9.	Level C.	Work upwind of dusty area if possible.
				Combination HEPA/organic vapor cartridges when dust concentration exceeds 5 mg/m^3	Suppress dust to less than 2.5 mg/m^3 with water whenever the water will not interfere with analysis.
		Ticks	Visual inspection	Wear long-legged pants and work boots.	Wear coveralls with wrists and ankles taped to gloves/boots.
					Use tick repellent containing over 30 percent DEET on exposed skin areas and hair
		Prairie Rattlesnake	Visual inspection	Wear long legged pants and work boots.	Make noise and probe areas with long stick before stepping.
		Black Widow Spider	Visual inspection	None	Wear gloves

TABLE 3.2 OPERABLE UNIT 7 SUMMARY TABLE

Field Location (IHSS #)	Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
IHSS 114, IHSS 203, and East Landfill Pond	Non-intrusive activities such as radiological and geographical surveys.	Common hazards listed above.	Particulate dust monitoring	Level D.	None
		Radionuclides	Alpha monitoring: Ludlum Model 12 with 43-5 probe Beta/gamma monitoring: Ludlum Model 12 with 44-9 probe.	Level D.	None
	Intrusive activities such as borings and monitoring well installations	Buried drums. Drums and other containerized wastes will be presumed to be present.	Metal survey, HNu (PID), CGI.	Wear Level C until hazards have been determined by air sampling. (See Table 9.3.)	Avoid metal mass. Offset borings/wells by at least ten feet.
		Underground utilities	Check with plant or public utility locate		Offset borings/wells by at least ten feet.
		Overhead hazards	Visual inspection		De-energize high voltage lines in accordance with lock-out/tag-out regulations or maintain safe distances as specified by OSHA.

TABLE 3.2 OPERABLE UNIT 7 SUMMARY TABLE

Field Location (IHSS #)	Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
IHSS 114, IHSS 203, and East Landfill Pond	Intrusive activities such as borings and monitoring well installations	Volatile chemicals	PID, air sampling pump (EPA method TO-2), sensidyne tubes (if required).	Wear Level C until hazards have been determined by air sampling. (See Table 9.3.)	None
		Potential for elevated concentrations of radionuclides.	Alpha monitoring: Ludlum Model 12 with 43-5 probe. Beta/gamma monitoring: Ludlum Model 12 with 44-9 probe	Wear Level C until hazards have been determined by air sampling. (See Table 9.3.)	Dust suppression using water spray.

TABLE 3.2 OPERABLE UNIT 7 SUMMARY TABLE

Field Location (IHSS #)	Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
IHSS 114, IHSS 203, and East Landfill Pond	Intrusive activities such as borings and monitoring well installations.	Fugitive dusts which may be contaminated with heavy metals, radionuclides or chemical contaminants.	Particulate dust monitoring	Wear Level D until direct reading instrument action levels are exceeded, then Level C. See Table 9.3.	Dust suppression using water spray.
		Methane (explosive atmosphere)	CGI	If greater than 20 percent LEL, withdraw and allow methane to dissipate	None.
	Surface sampling including East Landfill Pond water and sediment sampling	Radionuclides	Radiation monitoring with Ludlum Model 12 with 44-9 beta/gamma probe; Ludlum Model 12 with 43-5 Alpha probe	Wear Level D until direct reading instrument action levels are exceeded, then Level C. See Table 9.3.	None.
		Water safety hazards	Not applicable	Life jackets	Boat safety training

4.0 HAZARD COMMUNICATION

4.1 Introduction

STOLLER personnel and all STOLLER-subcontractors must follow established work practices to safely handle hazardous chemicals. A hazardous chemical is broadly defined as "a chemical that is either a health hazard, a physical hazard or both." The implementation of a hazard communication program is also required by 29 CFR 1910.120 for RCRA treatment, storage, and disposal facilities. WALSH will maintain an inventory of hazardous chemicals stored on-site and material safety data sheets (MSDSs) for those chemicals that will be available to employees at the site.

4.2 Hazardous Materials Inventory

STOLLER will compile an inventory of hazardous chemicals present at their work sites or trailer areas and provide this information to EG&G Industrial Hygiene Department. The inventory may be requested by emergency response personnel to aid in identifying hazards associated with a spill or accident at the site. Radiological check sources and/or reference sources must also be included in this inventory including applicable calibration certificates.

4.3 Material Safety Data Sheets (MSDSs)

The MSDS must be readily available to employees for hazardous chemicals used or stored at the site. Information found on a MSDS includes identification of the product's hazardous chemical constituents, its physical characteristics, applicable exposure limits, symptoms of overexposure, recommended PPE, fire and explosion hazards, and spill response actions. This information is provided by the manufacturer and is typically included with the shipment of the chemical. The EG&G Industrial Hygiene Department maintains a master file of MSDS for materials stored or used at the plant. A complete file of MSDS for hazardous chemicals used at OU7 will be kept at the STOLLER project trailers and readily available to site employees.

4.4 Training

STOLLER personnel and all STOLLER-subcontractors are required to complete Hazard Communication training as part of their 40-hour OSHA training. Specific training on the information provided in the MSDS will be conducted by the WALSH HSO, or, if necessary, by a representative of the EG&G Industrial Hygiene Department. Specific hazards associated with the project will be communicated to workers at the site-specific briefing and then at the weekly safety meetings.

5.0 SITE CONTROL

5.1 Objectives

The purpose of this site control plan is to protect workers, the public, and the environment from the potential hazards associated with the OU7 RFI/RI work. The terms "site control" and "controlled" versus "uncontrolled" are used in this section in the context of hazardous waste sites. This OSHA terminology does not necessarily apply to formal radiological definitions used in RFP production facilities.

In addition to general site control measures required under the 29 CFR 1910.120, activities conducted at OU7 shall be conducted in accordance with the EG&G Integrated Work Control Program (IWCP). WALSH personnel will adhere to requirements of the IWCP. A radiation work permit may also be required as part of the IWCP in areas where suspected radionuclides exist. Information required for the radiation work permit includes job information, description of hazards, radiological and nonradiological safety requirements, preparation for the job, approval signatures, and permit duration.

5.2 Site Control Designations

Two site control designations are used for potentially hazardous locations at OU7. The work location itself is designated as an EZ and the staging area outside a work location is designated as a CRZ. Access to these areas will be controlled. Personnel working in the areas must meet specific training requirements, be participants in a medical surveillance program, and wear required PPE. Minimum requirements for access to these designated areas are summarized below. Detailed PPE, training, and decontamination requirements are presented in the respective sections of this SSHSP.

5.2.1 Exclusion Zone (EZ)

During investigative activities at OU7, an EZ will be established by STOLLER personnel conducting work at the site. An entire IHSS may be designated as an EZ during investigations if necessary. As a minimum, individual work areas (drill sites, excavation sites, sample areas, etc.) inside of the IHSS will be designated as an EZ. The limits of these zones and the PPE requirements within the zones will be based on the hazards of the work being conducted, as determined by the appropriate health and safety representative. Environmental samples collected at these sites may contain elevated levels of radiological and/or chemical contaminants. Personnel entering these areas will be required to wear appropriate PPE. When leaving these areas, decontamination procedures (described in Section 7.0) will be followed where required, including clearance by approved WALSH health and safety personnel.

In addition, radiation site control measures may be implemented in OU7. The site control designations are a "RCA" and a "contaminated area." This classification is based on the activity or procedure to be performed and/or the level of possible exposure/contamination to the worker.

Radiation site control designations include the following:

- A "RCA" is designated when the contamination levels are below established standards, but radiological precautions may be necessary to alert workers of potential hazards.
- A "contaminated area" is designated when contamination is elevated above permissible levels. When elevated levels occur, the controlled area is also posted as a contaminated area. All contamination levels shall be maintained within acceptable limits by using appropriate control methods and kept as low as reasonably achievable (ALARA). All contaminated waste shall be properly contained and properly identified.

A radiation work permit and a site access log will be posted at the entrance to each RCA. Entry and exit requirements shall be posted as per ROI 1.03. The control limits for each area are given in Table 7-3.

5.2.2 Contaminant Reduction Zone (CRZ)

Adjacent to the site- or task-specific EZ will be the CRZ, where appropriate measures will be in effect to reduce the potential for spreading contamination via the workers and equipment. The entrance, exit, and decontamination area adjacent to the EZ will be designated as a CRZ. All personnel conducting or supervising activities in this area are required to have appropriate training.

5.2.3 Support Zone

The Support Zone will be outside the CRZ and will be the area where support workers will provide assistance to workers inside the EZ and CRZ. The Support Zone will begin at the exit from the decontamination line. Only clean or appropriately containerized equipment or material will be allowed to exit into the support zone from the CRZ. Visitors and observers will comply with the site control designations and the zone requirements established at the work site. Visitors will not be allowed to enter the EZ and/or CRZ without training as required in Section 10.0 of this SSHSP.

5.3 Communication Within Control Zones

Personnel will not conduct work activities at OU7 alone. They will be accompanied by either another STOLLER employee or STOLLER-subcontractor employee. The buddy system, as specified in 29 CFR 1910.120 (d)(3), will be implemented at the site. The buddy teams working at the site will maintain visual and audible contact so that they can provide emergency assistance to each other, if needed. Both members of the buddy team need not be in the same site zone, but each member must be wearing adequate PPE to assist the other, if necessary.

The communication system at the site consists of telephones and hand-held radios. STOLLER personnel will have access to telephones in the STOLLER project trailers in the STOLLER-subcontractor trailer area, and when at OU7, they will rely on the hand-held radio system used by personnel performing the investigative work.

5.4 Plan for Prevention of Contaminant Dispersion (PPCD)

5.4.1 Objective

The objective of the PPCD is to establish procedural requirements to mitigate potential hazards to the general public as a result of contact with emissions resulting from intrusive RI activities.

5.4.2 Scope

Procedural requirements for the prevention of contaminant dispersion, applicable to intrusive actions conducted at OU7 work sites as part of the RFI/RI activities described in the Interagency Agreement (IAG), are described in the PPCD prepared by EG&G. Intrusive activities that fall within the scope of this PPCD are those with the potential for producing suspended particulate, primarily through mechanical actions. Intrusive activities susceptible to producing appreciable quantities of suspended particulate include:

- Monitor well and soil/rock borehole installation
- Excavations (such as trenching and test pitting) using powered equipment.

Additionally, heavy vehicular traffic associated with RFI/RI activities will be considered susceptible to producing appreciable quantities of suspended particulate. By contrast, activities such as surface soil sampling with hand implements may not be considered susceptible to producing appreciable quantities of suspended particulate.

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

6.1 Introduction

Standard procedures for selection, inspection, and use of PPE at OU7 are addressed in this section. The criteria used to determine appropriate levels of PPE include evaluation of the tasks being performed, potential chemical, radiological, and mechanical hazards at the site, results of air monitoring data, effectiveness of engineering controls, and applicable regulations.

The use of PPE is required when engineering and administrative controls are insufficient to prevent worker exposures to hazardous chemical and radioactive materials. Due to the nature of work performed at OU7, there is a potential for release of chemical vapors and contaminated particulates which cannot be completely controlled at the source. Engineering and administrative controls will be used, when appropriate, to minimize potential worker exposures to the site contaminants; however, the use of PPE will be necessary to maintaining exposure ALARA.

A number of federal agencies dictate the need and use of PPE at hazardous waste sites. Among these agencies are OSHA, EPA, and DOE. Table 6-1 lists the specific OSHA standards that impact the manufacture, selection, and use of PPE. These regulations should be consulted for general information and specific requirements regarding the use and application of PPE.

This PPE program defines the initial levels of protection that have been selected and designed for each of the site activities proposed on this project. In addition, higher or lower levels of protection may be appropriate based on the site conditions and air monitoring results obtained. The contingency protective equipment requirements are also defined. The PPE requirements will be reevaluated by the site HSO as the work proceeds and recommendations for modifications to this program will be made to the STOLLER-PM by the project HSO as required.

EG&G personnel, DOE representatives, or other authorized site visitors requiring access into areas zoned as restricted or exclusionary will follow the personal protective equipment requirements set in this plan.

6.2 PPE Issues Applicable to All Site Personnel

All personnel assigned to OU7 must be trained in the proper inspection and use of the PPE used on this project before beginning work on the site. This training requirement is fulfilled

TABLE 6-1 OSHA STANDARDS FOR USE OF PPE

TYPE OF PROTECTION	REGULATION	SOURCE
General	29 CFR Part 1910.132 General Requirements for PPE	41 CFR Part 50-204.7
	29 CFR Part 1910.1000	OSHA Rulemaking
	29 CFR Part 1910.1001-1045	OSHA Rulemaking
Eye & Face	29 CFR Part 1910.133 (a)	ANSI Z87.1-1968[a] Eye & Face Protection
Noise Exposure	29 CFR Part 1910.95	41 CFR Part 50-204.10 & OSHA Rulemaking
Respiratory	29 CFR Part 1910.134	ANSI Z88.2-1969[a] Standard Practice for Respiratory Protection
Head	29 CFR Part 1910.135	ANSI Z89.1-1969[a] Safety Requirements for Industrial Head Protection
Foot	29 CFR Part 1910.136	ANSI Z41.1-1967[a] Men's Safety Toe Footwear

[a] ANSI, 1430 Broadway, New York, N.Y. 10018. ANSI regularly updates its standards. The ANSI standards in this table are those that OSHA adopted in 1971. Since the ANSI standards which were then adopted had been set in 1967-1969, those standards, now required under OSHA, may be less stringent than the most recent standards.

through completion of the 40-hour OSHA course discussed in Section 10.0, TRAINING, but site-specific training will cover the PPE requirements of this project.

All personnel working on this project who may be required to wear an air-purifying respirator must have a current medical clearance issued by a qualified physician and a fit test certificate for the size and make of respirator used. This clearance will be updated annually with the employee's physical exam as described in Section 8.0 of this SSHSP.

The HSO and individual team members are responsible for the inspection of their own and their team member's equipment during donning and field use. An inspection checklist is presented in Table 6-2. Personnel who are having equipment difficulties or experience tears in their suits should proceed directly to the CRZ for repairs or replacement of their equipment. If an exposure to site contaminants is suspected as a result of equipment failure, immediately contact the HSO or the EG&G Industrial Hygiene Department.

6.3 Components of Levels of Protection

OSHA and the EPA define four levels of protective equipment ensembles in the 29 CFR 1910.120 regulations, Levels A, B, C, and D. Levels A and B specifying the use of self contained breathing apparatus (SCBA) are not addressed in this SSHSP. If either of these levels of protection are required due to the presence of extreme site hazards, this situation will be handled as a separate amendment to this plan.

The levels of protection that are defined for this project include level C, Level D and a modified Level D. The specific equipment that is identified for each of these general ensembles is listed in Table 6-3.

6.4 Levels of Protection for Site Activities

The minimum safety equipment required for all personnel on this project site includes a hard hat, EG&G coveralls, and steel toed shoes. No workers, visitors or other personnel will be allowed on this project without these safety items even in the non hazardous areas. The general level of protection required for each site activity is listed in Table 3.1 and on Table 6-2 and the specific equipment required within each level of protection is listed in Table 6-3. Minimum levels of PPE by activity are listed in Table 6-4.

All non-intrusive activities will be performed in a modified Level D with skin, hand, and boot coverings. Intrusive activities will initially be performed in Level C (air purifying respirators) until the air quality can be characterized and a lower level of protection can be proposed. The decision to downgrade the level of protection will be made with the concurrence of the HSO, the STOLLER-PM, and the EG&G PM.

TABLE 6-2 GENERAL PPE INSPECTION CHECKLISTS[1]

CLOTHING

Before use:

- Determine that the clothing material is correct for the specified task at hand.
- Visually inspect for:
  - imperfect seams
  - non-uniform coatings
  - tears
  - malfunctioning closures
- Hold up to light and check for pinholes.
- Flex product:
  - observe for cracks
  - observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical degradation:
  - discoloration
  - swelling
  - stiffness

During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
  - closure failure
  - tears
  - punctures
  - seam discontinuities

Air-Purifying Respirators

- Inspect air-purifying respirators:
  - before each use (before using a newly supplied respirator ensure that the storage bag is sealed)
  - after each use
- Check mask for:
  - pliability
  - signs of deterioration
  - distortion
  - missing or broken parts
- Examine cartridges or canisters to ensure that they are the proper type for the intended use.
- Check face shields and lenses for:
  - cracks
  - crazing
  - fogginess
- Perform positive and negative pressure fit tests prior to each use.

[1] Specific procedures recommended by equipment manufacturers should be followed.

TABLE 6-3 SPECIFIC REQUIREMENTS FOR EACH LEVEL OF PROTECTION*

Level of Protection	Equipment	Protection Provided	Should Be Used When	Limiting Criteria
D	REQUIRED: • Steel-toed boots or shoes. • Long legged pants. • Safety glasses or chemical splash goggles. OPTIONAL, AS REQUIRED • Work Gloves. • Coveralls. • Hearing protection • Hard hat.	No respiratory protection. Minimal skin protection.	• The atmosphere contains no known hazard. • Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.	• May be worn in support or the CRZ. • This level should not be worn in the EZ. • The atmosphere must contain at least 19.5 percent oxygen.
Modified D	REQUIRED: All requirements of Level D plus: • Chemically protective (CP) suit - either tyvek or polyethylene coated tyvek • Inner and outer gloves Options, as required: • splash shield • hearing protection • eye protection	Increased skin and splash protection, but no respiratory protection.	Working in dusty areas or in areas with splash potential where low inhalation hazard is presented.	• May be worn in the exclusion zone if the area has been demonstrated to be free of air contaminants above the action levels. • The atmosphere must contain at least 19.5 percent oxygen.
C	REQUIRED: • Full-facepiece, air-purifying respirator equipped with both organic vapor and HEPA filter cartridges. • CP clothing dependent on the specific area working: - TYVEK full body suit for dry areas, or, - Polyethylene coated TYVEK for situations in which splash hazards exist. • Inner latex glove and outer nitrile gloves (taped to suit) • Chemical-resistant safety boots/shoes or steel toed work boots with latex overshoes (taped to suit) • Hard hat. • Two-way radio communications. OPTIONAL, AS REQUIRED: • Coveralls under CP suit. • Face shield for splash protection. • Long cotton underwear.	Respiratory protection up to 50 times the permissible exposure level of selected contaminants (particulates, and some organic compounds), and skin and splash protection from contaminated dust and water.	• The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin. • The types of air contaminants have been identified, concentrations measured, and a canister is available that can remove the contaminant. • All criteria for the use of air-purifying respirators are met.	• Atmospheric concentration of chemicals must not exceed IDLH levels. • The atmosphere must contain at least 19.5 percent oxygen.

TABLE 6-4 MINIMUM LEVELS OF PPE BY ACTIVITY

WORK ACTIVITY	Initial Level of Protection	Additional Comments	Contingency PPE
Project activities in non-hazardous areas: - Work in support zone - Work in mobile laboratory	Level D	No contact or access to contaminated areas is permitted for personnel in this level of protection.	No significant exposures to any of the site contamination is expected.
Non-intrusive site activities: - Initial visual site survey - Initial radiological screening - Pond sediment sampling - Surface water sampling - Survey of sample locations - Decontamination of personnel	Modified Level D	Tyvek suits, gloves, and boot covers are required for all access into the EZ regardless of activity	Upgrade to Level C if air monitoring action levels are exceeded (see Section 9.0).
All intrusive activities in the EZ: - Drilling monitoring wells - Monitoring well installation - Ground-water sampling - Subsurface soil sampling - Cone penetrometer testing - Drilling soil borings - Pump tests of wells - Gross decontamination of heavy equipment	Level C	Tyvek suits can be used during activities with no splash hazards. Water sampling and work around the pond requires the use of PVC suits.	Down grade any intrusive activity level of protection if air monitoring shows no significant inhalation hazards are posed to workers. If upgrade is necessary, contact HSO and PM.
Intrusive activity in non-hazardous areas: - Drilling upgradient wells	Modified Level D	Tyvek or PVC coated tyvek suits with gloves and boot covers required for all work in this area.	Upgrade to Level C if air monitoring action levels are exceeded (see Section 9.0).

Section 9 defines the air monitoring program that will help to characterize the inhalation hazards posed to the workers. This section also specifies the acceptable concentrations of air contaminants that workers can be exposed to without respiratory protection and the action levels for upgrading or downgrading the levels of protection.

6.5 Reuse of PPE

All disposable protective equipment (TYVEK suits, gloves, etc.) must be removed and disposed of during decontamination whenever a worker leaves the EZ or CRZ. This includes leaving the site after five minutes or a full day. The length of the service life of a respirator cartridge, with activated carbon or other chemical adsorbing element, will be determined by the following criteria:

- Breathing resistance becomes excessive;
- Chemical odors are detected by the wearer, or
- Dispose of chemical respirators after a minimum of 7 days of use, sooner if necessary.

Containers will be provided for the disposal of PPE used in on the site in the decontamination area. Procedures for the use and disposal of PPE are given in SOP FO.6 - Handling of PPE, and shall be strictly followed.

7.0 DECONTAMINATION

7.1 Introduction

The objective of decontamination is to remove hazardous substances from workers and equipment, to assure compliance with DOE Order 5480.11 and OSHA Standard 29 CFR 1910.120, to prevent the spread of contamination from the site, and to prevent potential adverse health effects that could be caused by contact with hazardous materials by unprotected workers.

Decontamination requirements and procedures at OU7 will vary according to the task and the hazardous materials encountered. It is expected that workers on the site will directly encounter hazardous materials during the remedial investigation activities on this site. Safe work practices and engineering controls should be undertaken to prevent equipment and personnel from becoming contaminated during the work on this site. All equipment, samples, personnel, and vehicles leaving the exclusion zone will be checked for chemical and radiological contamination, and effective appropriate decontamination procedures will be undertaken to remove any contamination prior to release of the equipment from the site.

The decontamination of personnel and equipment will be performed in the contamination reduction zone at the exit to the exclusion zone. Facilities to doff protective equipment and for respirator and personnel washing will be provided in this area. Containers will be provided for collection of disposable protective clothing. An equipment wash station will also be prepared to spray clean all vehicles, drill rigs, and augers in the decontamination area.

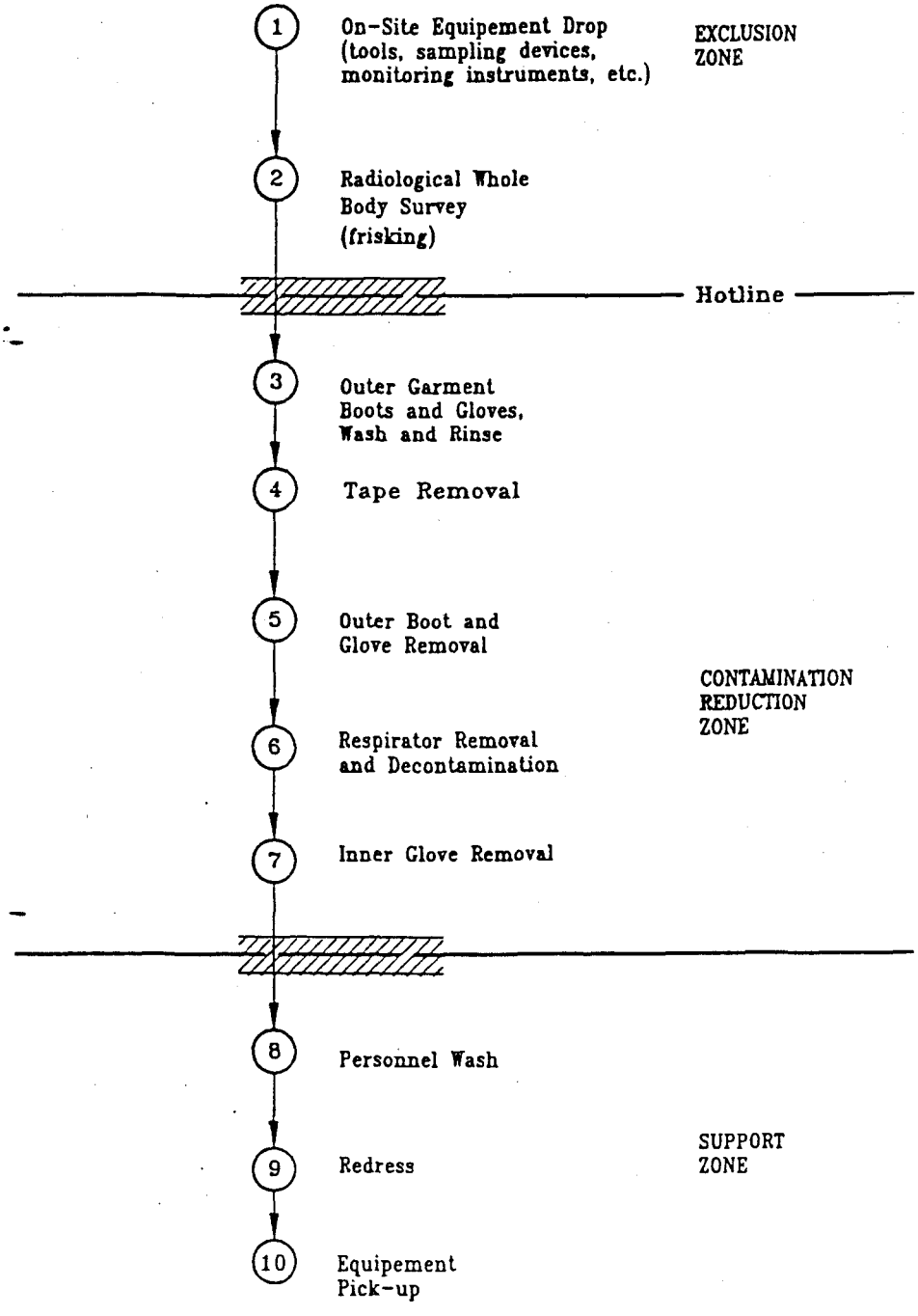
7.2 Decontamination Procedures

7.2.1 Personnel and Small Equipment Decontamination

Decontamination procedures for the various phases of work at OU7 will be determined by the hazardous materials present at each site. The hazardous materials known to be present thus far include organic solvents, metals, and radionuclides. It is the responsibility of the HSO, or designee, to determine whether radiological contamination of personnel or equipment exists and to prescribe the decontamination procedures that will be required.

The requirements for chemical decontamination will depend on the type of chemical present. An outline of the general procedure for decontamination for personnel performing work at Levels C and D are outlined in Figures 7-1 and 7-2, and Tables 7-1 and 7-2. Safe work practices are to be exercised at all times to prevent or minimize personnel and equipment

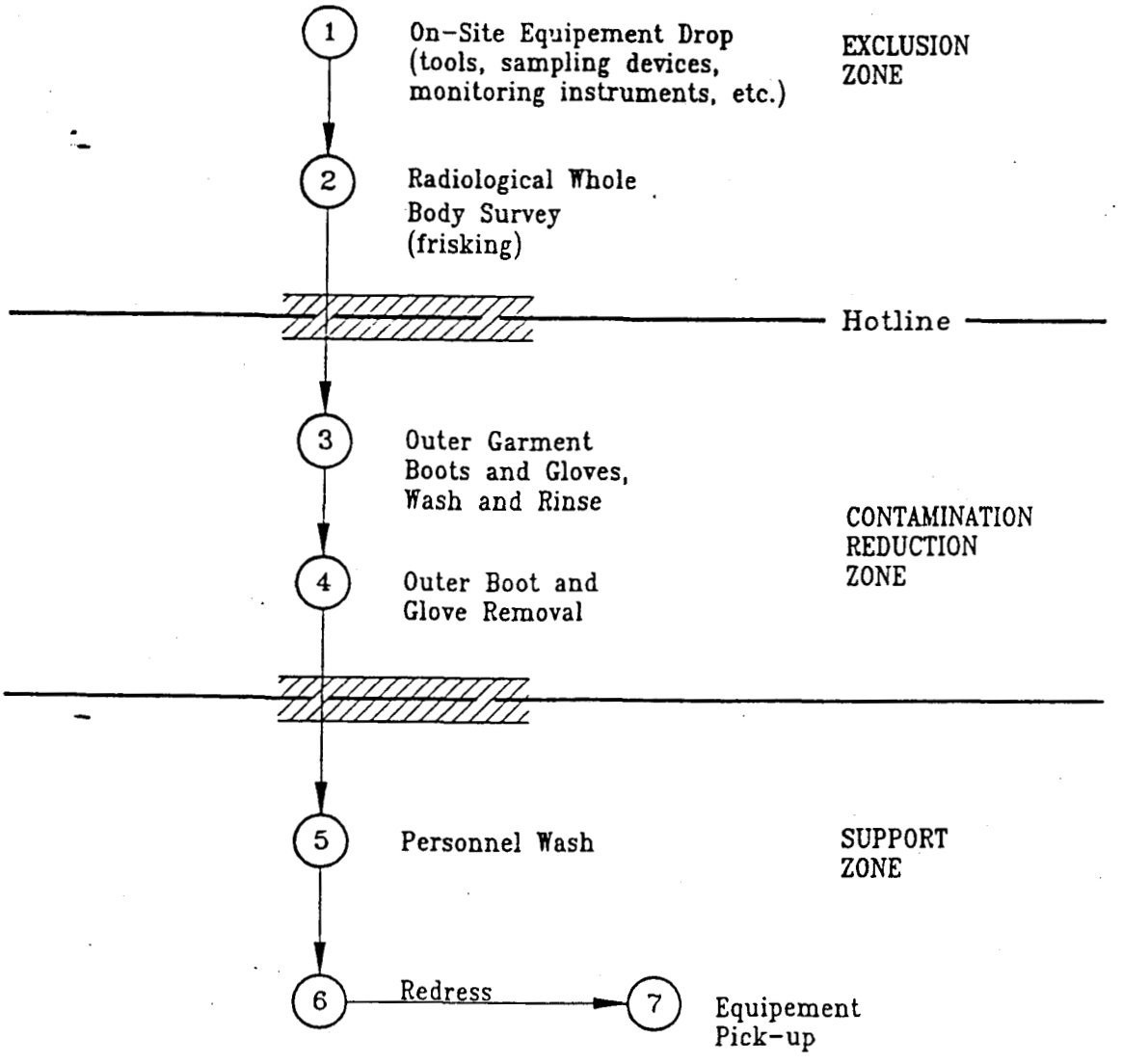
Decontamination Station
Level C



Decontamintaion Station Level C		
Job 306-10	Date 10/92	Figure 7.1

306-1f1.dwg 9/30/92

Decontamination Station
Level D



Decontamintaion Station Level D		
Job 306-10	Date 10/92	Figure 7.2

306-1f1.dwg 10/13/92

TABLE 7-1 LEVEL C DECONTAMINATION PROCEDURE

ACTIVITY	PROCEDURE	ITEMS SUGGESTED
1. Equipment drop	Drop equipment (hard hats, tools, samples, etc.) on plastic labeled, "EQUIP." Decontamination Technician will decontaminate equipment.	1. Plastic sheet (10 feet x 10 feet) labeled "EQUIP".
2. Personnel survey (frisking)	Place the survey instrument probe within 1/2 inch of the body surface and move gradually to check the body. A rate of 1 to 2 inches per second is considered acceptable.	
3. Glove and boot wash/rinse*	Enter "HOT" side of decontamination zone. Wash/rinse gloves and boots by spraying with detergent solution and rinse solution while standing in appropriate tubs. Scrub as needed.	1. Plastic sheet (15 feet x 30 feet) divided in half and labeled "HOT" and "COLD." 2. Wash tubs (2) 3. Pump sprayer (2) 4. Detergent 5. Scrub brush 6. Duct tape 7. Trash can
4. Tape removal	Remove tape from wrists, facepiece, and boots.	
5. Outer boot, glove, and suit removal	Remove outer boots, gloves, and suit with inside out method. Drop into "CONTAMINATED" trash can.	
6. Respirator removal and decontamination	Hand respirator to Decontamination Technician for decontamination.	
7. Inner glove removal	Remove inner gloves.	
8. Personnel wash	Wash/rinse face and hands in wash basin. Use hand cleaner, if preferred.	1. Wash basin 2. Paper towels 3. Portable shower 4. Soap 5. Hand cleaner
9. Redress	Change into street clothes.	
10. Equipment pick-up	Equipment decontaminated by Decontamination Technician may be picked up.	

* This step may be omitted if disposable outer garments are worn. Proceed directly to step 3.

TABLE 7-2 LEVEL D DECONTAMINATION PROCEDURE

ACTIVITY	PROCEDURE	ITEMS SUGGESTED
1. Equipment drop	Drop equipment (hard hats, tools, samples, etc.) on plastic labeled, "EQUIP." Decontamination Technician will decontaminate equipment.	1. Plastic sheet (10 feet x 10 feet) labeled "EQUIP".
2. Personnel survey (frisking)	Place the survey instrument probe within 1/2 inch of the body surface and move gradually to check the body. A rate of 1 to 2 inches per second is considered acceptable.	
3. Glove and boot wash/rinse*	Enter "HOT" side of decontamination zone. Wash/rinse gloves and boots by spraying with detergent solution and rinse solution while standing in appropriate tubs. Scrub as needed.	1. Plastic sheet (15 feet x 30 feet) divided in half and labeled "HOT" and "COLD." 2. Wash tubs (2) 3. Pump sprayer (2) 4. Detergent 5. Scrub brush 6. Duct tape 7. Trash can
4. Outer boot, glove, and suit removal	Remove outer boots, gloves, and suit with inside out method. Drop into "CONTAMINATED" trash can.	
5. Personnel wash	Wash/rinse face and hands in wash basin. Use cleaner, if preferred.	1. Wash basin 2. Paper towels 3. Portable shower 4. Soap 5. Hand cleaner
6. Redress	Change into street clothes.	
7. Equipment pick-up	Equipment decontaminated by Decontamination Technician may be picked up.	

* This step may be omitted if disposable outer garments are worn. Proceed directly to step 3.

contamination. Appropriate PPE will be used during decontamination operations as an additional measure to prevent direct employee exposure to hazardous substances.

Current EG&G SOPs should be consulted for specific decontamination requirements. These procedures include SOP FO.03 - General Equipment Decontamination; SOP FO.06 - Handling of PPE; and SOP FO.07 - Handling of Decontamination Water and Wash Water.

Respirators will be frisked and smeared for contamination prior to removal and cleaning. If radiological contamination is discovered on the exterior of the respirator, it should be removed before washing or disinfecting the face piece. (Head should also be frisked if respirator is found to be contaminated.) Respirators should be wiped clean by site personnel as they are removed. They must be stored in a plastic bag, with the cartridge side down, so that distortion of the facepiece does not occur.

7.2.2 Heavy Equipment Decontamination

WALSH subcontractors will be providing or operating heavy equipment such as drill rigs at OU7. Any such heavy equipment used at the site must be checked for contamination and decontaminated (if necessary) prior to leaving the area. Large pieces of equipment will be frisked with radiological survey instruments and smears collected as needed to meet radiological decontamination standards. Surface contamination surveys and release of equipment shall be performed in accordance with EMRGs 3.1 and 3.2, respectively. Such equipment will be decontaminated in accordance with SOP FO.04 - Heavy Equipment Decontamination.

The main elements of FO.04 include:

- contamination reduction in the field
- contamination monitoring
- movement of contaminated heavy equipment
- main decontamination facility near the 903 Pad

7.2.3 Surface Contamination Surveys

The purpose of the surface contamination surveys will be to control and document all property/material to be released from RCAs and specified uncontrolled areas (e.g., any IHSS). All equipment which leaves the RCA must be surveyed and comply with the Property Release Evaluation forms as attached in Appendix C. Contamination control limits are given in Table 7-3. Radiological screening will be performed by the project RPT or by project personnel trained in performing this function (RPT's-IT). Table 7-3 outlines the maximum residual surface radiation contamination allowed for equipment leaving the EZ. These control limits are specified in the Radiation Control Manual.

TABLE 7-3 CONTAMINATION CONTROL LIMITS

ALPHA LIMITS

Area	Removable (dpm/100 cm_2)	Total Fixe/Removable (dpm/100 cm^2)
Uncontrolled	20	500 [1]
Controlled	20	500 [1]
Contaminated	200	3,000 [1]

BETA/GAMMA LIMITS

Area	Removable (dpm/100 cm^2)	Total Fixed Plus Removable (dpm/100 cm^2)
Uncontrolled	1,000	5,000 [2]
Controlled	1,000	5,000 [2]
Contaminated	1,000	5,000 [2]

1 500 dpm/100 cm^2 is the DOE limit for uncontrolled and controlled areas. 3,000 dpm/100 cm^2 is the DOE limit for contaminated areas. The minimum detectable activity (MDA) using the Ludlum Model 12-1A with air proportional detector of approximately 50 cm^2 is 1,000 dpm/100 cm^2 which corresponds to a 250 CPM instrument meter reading 500 dpm.

2 The MDA using the Ludlum Model 31 meter with the 44-9 pancake GM detector is 5,000 dpm/100 cm^2. This corresponds to a meter reading of 200 CPM. The maximum allowed background for this MDA is 100 CPM with the instrument range switch on the A1 setting.

7.2.4 Decontamination Water and Wash Water

All water used both in the EZ and during decontamination procedures will be disposed of according to SOP FO.07. The main elements include:

- handling of decontamination water
- handling of wash water

8.0 MEDICAL SURVEILLANCE

8.1 Medical Monitoring Requirements

All STOLLER field personnel and all STOLLER-subcontractors are participants in a medical monitoring program which fulfills the requirements of 29 CFR 1910.120. The program includes:

- Baseline medical examination including bioassay for radionuclides
- Annual medical examination
- Exit medical eExamination
- Incident specific examination

8.2 Availability of Medical Service

The EG&G Occupational Health Department is located in Building 122. The full staff is on duty from 7:30 am to 4:00 p.m. Monday through Friday. The registered nursing staff is on duty from 6:30 a.m. on Monday through 10:00 p.m. on Friday except 11:00 p.m. to 6:30 a.m. (midnight shift). A physician and a nurse are always on call for any emergency during off hours. Weekend coverage (Friday from 10:00 p.m. through Monday at 6:30 a.m. and midnight shift coverage) is provided by emergency medical technicians. They can be contacted at extension 4336 and will meet employees in the Occupational Health Department or respond to the site of any emergency. For life threatening emergencies, call extention 2911.

8.3 Transportation for Medical Reasons

STOLLER and all STOLLER-subcontractors employees will be provided transportation for medical reasons (if it is medically safe, as determined by the EG&G Occupational Health Staff) to their home or to an appropriate medical facility for the following:

- An emergency: EG&G Occupational Health will determine the appropriate mode of transportation for illness/injury requiring air or ground ambulance transport.
- A non-emergency: If there is no medical necessity for ambulance transport, supervisors will be asked to arrange transportation.

In a situation where an employee is injured and requires non-ambulance transport to an off-site medical facility, the STOLLER SM/FOL or designee, will accompany that person as a representative of STOLLER and be available to interface with outside authorities (if necessary) and to provide further transportation for the employee as appropriate. If STOLLER personnel are unable to arrange transportation on weekends or during night work

they will contact the EG&G Shift Superintendent (RFP Emergency Coordinator (EC)) at extension 2914 for assistance.

8.4 Medical Records

STOLLER and all STOLLER-subcontractors are required to keep medical information in an individual's file, including laboratory reports, electrocardiogram reports, x-ray reports, health histories, physical examinations, letters, and reports from the employee's personal or referral physician.

The medical records of all field personnel will remain in the possession of their corporate headquarters and will not be taken from the premises except for the purpose of answering subpoenas. Copies of the medical record will be released to the employee, insurance companies, attorneys, hospitals, and/or physicians when a written authorization has been presented to the STOLLER Health and Safety Department. A written authorization must:

- Specify that the company is to release the information;
- Be dated within the last 60 days;
- Specify to whom the information is to be released;
- Be completed in ink; and
- Be signed by the employee.

Medical information may not be released to anyone else without written authorization from the employee. Release of records associated with work-related or alleged work-related illness and injury may not require signed consent. A release may be requested to expedite communication with attending physicians.

If respiratory protection is required at the site, the physician must provide authorization that the employee is medically qualified to wear a respirator. STOLLER and STOLLER-subcontractor personnel required to wear a respirator will be fit tested annually.

9.0 AIR MONITORING

9.1 Introduction

This air monitoring program specifies equipment and procedures for identifying and quantifying airborne chemical and radiological contaminants during field activities within the OU7 project area. The objectives of this program include:

- Characterization of the airborne concentrations of dusts, mists, fumes, radionuclides, gases, and vapors present in the OU7 work areas.
- Acquisition of quantitative data to be used to verify the appropriate levels of PPE, site control measures and boundaries, work practices, and decontamination procedures.
- Ensure compliance with applicable airborne chemical and radiological exposure levels.
- To identify conditions that may be immediately dangerous to life or health.
- Ensure that no significant levels of contamination are migrating off site.

The monitoring of the air quality on this site will include the use of direct reading instruments and the collection of air samples for laboratory analysis. The program will be routinely evaluated for effectiveness. Any necessary changes will be made to account for analytical results obtained, changes in the work routine, and changes in the equipment required to meet the objectives of this plan.

9.2 Direct Reading Instruments

Direct reading or real time monitoring instruments provide instantaneous data on the concentration or identity of airborne contaminants present on the site. This data will be used to determine the appropriate levels of protection for workers in the immediate vicinity of the monitors, identify physical hazards such as explosive gas mixtures, and to identify situations that are unsafe for personnel in any level of protection. These monitors may also be utilized to determine the effectiveness of decontamination procedures on personnel and equipment.

The following direct reading instruments will be used during this project:

- An HNU Model HW-101 PID equipped with an 11.7 electron volt (eV) lamp will be used to monitor for many organic vapors.
- A Ludlum 12 with 43-5 alpha probe will be used to monitor dry equipment surfaces and dry PPE for the presence of alpha-emitting radioisotopes.
- Bicron Frisk-Tech with A-100 probe (optional).

- A Ludlum 12 with a 44-9 pancake probe will be used to monitor equipment and PPE for the presence of beta- and gamma-emitting radioisotopes.
- Bicron Frisk-Tech with B-50 (optional).
- A MIE PDM-3 MiniRAM real-time dust monitor or equivalent will be used to monitor for airborne particulates.
- A CGI will be used to detect the presence of flammable gases such as methane.
- Colorimetric indicator tubes will be used to identify selected organic or inorganic contaminants if the presence of chemicals that cannot be monitored using any of the other instruments is suspected.

9.2.1 Real-Time Chemical Monitoring

The use of the direct reading real-time monitors for chemical contaminants will be performed during all intrusive activities (drilling, soil and water sampling) on this project. The instruments will be used, calibrated, and maintained according to the manufacturers instruction. Each monitor will be calibrated at the beginning of each shift and then plugged in for recharging at the end of the shift or when if is no longer needed for the day.

A trained and qualified person will be responsible for performing the monitoring activities. One of the HSTs will perform the monitoring during the drilling and soil borings, and a trained representative will perform this activity during other intrusive site activities. All monitoring data such as calibration times, personnel performing calibration, maintenance logs, and site monitoring results will be logged and recorded in the field log books.

Table 9-1 lists the action levels to be applied to each direct reading instrument. These action levels list the particular level of protection or emergency response action that must be taken if certain readings are recorded on any of the instruments.

9.2.2 Real-Time Radiological Monitoring

Radiological monitoring involves the detection and measurement of alpha, beta, gamma, or neutron radiation. Radiological monitoring is established in accordance with appropriate and relevant requirements and policies. The goal of the radiation monitoring program is to maintain personnel exposure ALARA. Personnel and equipment contamination surveys will be performed in accordance with the appropriate EMRGs or ROIs. If radiological hazards are identified at action levels specified in Table 9-1 through personnel and equipment surveys conducted during site work, air monitoring will be performed. The WALSH HSO will be responsible for determining if an air sampling program is necessary, and for developing an air sampling program if potential radiological hazards are identified during site work. The EG&G Radiation Engineering representative must be notified and shall approve all radiological air sampling strategies before any air sampling is implemented.

TABLE 9-1 DIRECT READING ACTION LIMITS

INSTRUMENT	MONITORING GUIDELINES	INSTRUMENT READING	MANDATORY ACTION
HNU PID with 11.7 eV probe	Monitor regularly during all intrusive activities. Survey each area prior to work. Monitor in the worker's breathing zones.	0 - 5 ppm (in breathing zone)	No specific action. No respiratory protection required for organic vapors.
		5 - 50 ppm (in breathing zone)	Requires respiratory protection to Level C (see Table 6-3) with HEPA and organic vapor cartridges.
		> 50 ppm (in breathing zone)	Evacuate immediate area and contact HSO. Wait for vapors to dissipate and retest the air.
CGI	Monitor regularly during drilling and sampling in the landfill area.	0 - 10 percent LEL	No special precaution.
		10 - 20 percent LEL	Limit access to area. Use non-sparking equipment. Monitor continuously. No smoking in area. Remove ignition sources.
		> 20 percent LEL	Evacuate immediate area. Turn off all ignition sources. Wait for vapors to dissipate and retest. Do not continue work in area until readings are lower.
PDM-3 Dust Monitor	Monitor whenever visible dust is generated on the site. Monitor drilling, soil sampling and equipment moving.	0 - 5 mg/m^3	No special precautions.
		5 - 50 mg/m^3	Upgrade respiratory protection to Level C (see Table 6.3) with HEPA and organic vapor cartridges and implement dust suppression actions.
		> 50 mg/m^3	Evacuate immediate area. Use dust suppression (if possible). Wait for dust generation to cease or dissipate.
Ludlum Model 12 with 43-5 Alpha Probe	Survey all personnel and equipment leaving EZ and monitor soils and waters encountered during intrusive work.	0 - 1,250 CPM	No special precautions.
		1,250 - 2,500 CPM	Upgrade respiratory protection to Level C (see Table 6.3) with HEPA and organic vapor cartridge.
		> 2,500 CPM	Evacuate site and contact HSO.
Ludlum Model 12 with 44-9 Pancake Probe	Survey all personnel and equipment leaving EZ and monitor soils and waters encountered during intrusive work.	0 - 5,000 CPM	No special precautions.
		5,000 - 50,000 CPM	Upgrade respiratory protection to Level C (see Table 6.3) with HEPA and organic vapor cartridge.
		> 50,000 CPM	Evacuate site and contact HSO.
Colorimetric Indicator Tubes	Dependent upon identified air contaminants.	0 - 1/2 of PEL	No special precautions.
		1/2 - 10 times the PEL	Upgrade respiratory protection to Level C with appropriate cartridges (if available).
		> 10 times the PEL	Evacuate site and contact the HSO.

Monitoring of personnel and equipment for radiological contamination will be performed in the following situations:

- Whenever leaving a RCA;
- Whenever exiting a contaminated area;
- During and after work where the potential exists for release of radioactive material;
- Whenever passing through a RCA;
- Following personnel decontamination;
- When required by EG&G SOPs;
- When required by a radiation work permit; or
- When required by the EG&G Health and Safety Practices Manual, Section 18.10 "Release of Property for Conditional and Unrestricted Use".

9.2.3 Action Levels

All decisions regarding application of action levels for nonradioactive substances will be based on air monitoring guidelines (refer to Table 9-1 for Action Level). The action level for measurements of radioisotopes will be based on surface measurements of dry soil, equipment, or PPE. The HSO will notify the SM/FOL, who will in turn notify the EG&G PM immediately after any upgrade in PPE. The Health and Safety Liaison Officer and the Environmental Restoration Health and Safety Officer will also be notified.

9.3 Air Sampling Program

Samples of the air from the site will be collected to help identify and quantify the concentrations of air contaminants generated during site activities. The air samples will be submitted to a contract analytical laboratory for analysis. While this approach to the characterization of air quality takes considerably longer to obtain results, the more accurate and specific information can be valuable to ensure that the levels of protection that have been established are adequate to protect the workers.

Air sampling procedures for compounds and contaminants will be in accordance with NIOSH, EPA, OSHA procedures, or well documented air sampling methodology where these procedures are not available for a particular contaminant.

The air sampling results will also be used to define the PPE requirements of the site personnel. Samples will be taken of the air in the worker breathing zone and analyzed for selected target analytes. Table 9-2 lists COCs that were identified during previous investigations in this area. Table 9-3 lists the target analytes that have been selected to characterize the air quality during the intrusive activities. The sampling methods that will be used and the detection methods are also listed in this table. Three full sets of air samples

TABLE 9-2 CONTAMINANTS OF CONCERN (COC) AT OU7

CONTAMINANT	Location	Concentration (highest detected)	Exposure Limit (TLV/PEL)
PCBs	IHSS 203	possible	0.5 mg/m^3
Methane	IHSS 114	possible	20 percent LEL
RADIONUCLIDES			
Plutonium-239	IHSS 114	background	1.8 rem/year
Tritium	IHSS 114 leachate/surface water	approx. 500 pCi/l	500 pCi/l in water
Strontium 89 + 90	IHSS 114 leachate/surface water	background	8 pCi/l as Sr^{90} in water
Americium-241	IHSS Well 6287	3.19 pCi/l	1.8 rem/year
Cesium-137	IHSS Well 6287	4.67 pCi/l	1.8 rem/year
Uranium-233, 234	IHSS Well B206689	20 pCi/l	1.8 rem/year
Uranium-238	IHSS 114	background	1.8 rem/year
VOCs			
Carbon tetrachloride	IHSS 114 Well B206289	9 µg/l	2 ppm (skin) Ca
Vinyl chloride	IHSS 114 Well 6387	17 µg/l	1 ppm (Ca)
1,1,1-trichloroethane (TCA)	IHSS 114 Well 6587	19 µg/l	350 ppm
1,1-dichloroethane (DCA)	IHSS 114 Well B106089	11 µg/l	100 ppm
1,2-dichloroethylene (DCE)	IHSS 114 Well 6287	28 µg/l	200 ppm
Trichloroethylene (TCE)	IHSS 114 Well 6087	160 µg/l	50 ppm
Tetrachloroethylene (PCE)	IHSS 114 Well B206389	55 µg/l	25 ppm
Acetone	IHSS 114 Well B106089 at 15 feet	990 µg/l	750 ppm
2-butanone	IHSS 114 Well B106089 at 15 feet	330 µg/l	200 ppm
Methylene chloride	IHSS 114 Well B106089 at 1 foot	27 µg/l	50 ppm (A2)
Toluene	IHSS 114 Well B106089 at 12 feet	71 µg/l	100 ppm
Total xylenes	IHSS 114 Well B106089 at 4 feet	6 µg/l	100 ppm

TABLE 9-2 CONTAMINANTS OF CONCERN (COC) AT OU7

CONTAMINANT	Location	Concentration (highest detected)	Exposure Limit (TLV/PEL)
HEAVY METALS			
Arsenic	IHSS 114 Well B106089 at 6 feet	8.1 mg/kg	0.2 mg/m^3
Vanadium	IHSS 114 Well B106089 at 20 feet	93.4 mg/kg	0.05 mg/m^3
Iron	IHSS 114 Well B206189 at 25 feet	60,700 mg/kg	5 mg/m^3
Lead	IHSS 114 Well B206189 at 3 feet	29.4 mg/kg	0.15 mg/m^3
Copper	IHSS 114 Well B106089 at 20 feet	26.9 mg/kg	1 mg/m^3
Zinc	IHSS 114 Alluvial Well 7287	0.645 mg/l	5 mg/m^3 (oxide)
Nickel	IHSS 114 Alluvial Well 0786	0.795 mg/l	0.1 mg/m^3 (soluble)
Asbestos	IHSS 114 - Locations to be identified by EG&G	unknown	0.2 fibers/cc

TABLE 9-3 AIR SAMPLING METHODS

Sampling Factors	Method No.	Analytes	Collection Media	Laboratory Detection Method
VOCs	EPA T0-2	16 specified VOCs	TENAX	Thermal desorption using gas chromatography/ mass spectrometry (GC/MS)
VOCs	NIOSH 1500, 1501, or 1502	Target hologenerated aromatic or aliphatic hydrocarbons when identified by GC/MS analysis	Charcoal tube	Solvent description, GC with FID or PID detection
Metals	NIOSH 7300	Arsenic, Lead Vanadium	0.8 μ MCE filter	ICP
Radionuclides	**	**	GF filter	**
Particulates	NIOSH 0500	Total nuisance particulates	5 μ PVC preweighed	Gravometric

** Methods and analysis to be supplied by EG&G Radiation Engineering.

will be colected at the beginning of each major phase of site work to determine the appropriate level of PPE that will be required to complete the work phase. The results of each set of air sampling will be evaluated and reported to the HSO and the STOLLER and EG&G PMs for an evaluation of the levels of PPE required to complete the phase of work.

Decisions regarding the frequency and types of air samples that will be collected for other phases of the project will be made by the project HSO with consultation with the PM, the project RPT, or the SM/FOL. Sample locations, sample types, target analytes, the frequency of the sample collection, and rationale for the sampling proposal will be presented to the PM for review and approval.

All air samples will be collected by the site HSO using calibrated personnel or high volume air sampling pumps and sample media provided by the laboratory. All pertinent sampling information will be recorded in the field log book and on air sampling worksheets. These samples may be collected in work areas, in the breathing zones of workers on the project, or at the perimeter of the site as required to meet the objectives of the sampling effort. A statistically significant number of samples, representative of the actual exposure to a compound or contaminant, will be obtained. In some instances sampling may be performed during the entire operation or shift. Workers selected for personnel sampling will be notified of all air sampling results in a timely manner.

9.4 Personnel Radiation Monitoring

All field personnel on this project will be involved in the RFP personnel radiation dosimetry program during site activities. The program entails the use of personal radiation dosimeters coupled with laboratory analyses to determine the radiation doses experienced on the site. Badges will be provided to each worker and turned into the dosimetry office at specified frequencies. EG&G will be responsible for providing thermoluminescent dosimeters, analyses of dosimeters, and reporting the results to the site HSO. Results will be given to employees, kept in health and safety files, and maintained by each contractor.

9.5 Actions Levels for Radionuclides

Derived air concentration (DAC) values will be utilized to identify the respiratory protection requirements for the workers on the project. Air samples will be collected daily in the areas of intrusive activities performed by protected workers. After the results of the analysis are obtained, these data will be compared to the DAC table included in Appendix E and a decision will be made of downgrading the level of protective equipment as appropriate.

10.0 TRAINING

STOLLER and all STOLLER-subcontractor personnel assigned to OU7 must complete the training required by OSHA as well as site-specific health and safety training courses required by EG&G. OU7 is an environmental investigation classified as a hazardous waste operation by OSHA standard 29 CFR 1910.120; therefore, the training requirements, including the initial training, annual refresher training, and supervisor training, apply to STOLLER and STOLLER-subcontractor personnel working at the site. Additional training courses required by EG&G include General Employee Training (GET), radiation worker, and respirator training.

10.1 Training Requirements

10.1.1 Hazardous Waste Site Health and Safety

Any STOLLER or STOLLER-subcontractor employee assigned to work at OU7 must complete the hazardous waste health and safety course required by OSHA in 29 CFR 1910.120(e). The length of the required course may be 40 hours or 24 hours, based on the worker's assigned tasks. The 40-hour course and 3 days of supervised field experience is mandatory for workers who may be required to use respiratory protection equipment and/or who are engaged in activities in which they may be exposed to hazardous substances and health hazards at or above the permissible exposure limits (PEL).

All hazardous waste workers must complete an annual 8-hour refresher course. The course content consists of a summary of the 40-hour course. Supervisors of hazardous waste sites or of tasks conducted on hazardous waste sites must complete an additional 8-hour supervisor health and safety training course. A summary of training requirements is given in Table 10.1.

10.1.2 Radiation Worker Training

STOLLER and STOLLER-subcontractor personnel performing field work must complete the 1-day class entitled "Radiation Safety for Environmental Restoration" offered by the EG&G Performance Based Training Department.

10.1.3 Site-Specific Briefing

STOLLER and all STOLLER-subcontractor employees assigned to work on OU7 must receive a briefing that introduces site safety, emergency procedures and the information contained in the SSHSP. The briefing should provide enough detail that employees can implement the SSHSP and safely perform their assigned tasks.

TABLE 10-1 1910.120 TRAINING REQUIREMENTS FOR OU7

Operation/Personnel	Site Safety Briefing	24-Hour	40-Hour	8-Hour Supervisor	8-Hour Refresher
Routine or occasional site worker	Yes	Yes[3]	Yes	N/A	Yes
Routine or occasional site worker (support zone)	Yes	N/A	N/A	N/A	N/A
On-site supervisor	Yes	Yes[4]	Yes	Yes	Yes
Visitor[1, 2]					
• Level A or B PPE)	Yes	N/A	Yes	N/A	Yes
• Level C PPE	Yes	Yes	N/A	N/A	Yes
• Level D or No PPE	Yes	N/A	N/A	N/A	N/A

1 All visitors should be issued and instructed in the use of required PPE, receive a site-specific safety briefing, and be escorted by training personnel.

2 Visitors are not directly involved with hazardous waste operations (e.g., management, audit, and oversight personnel). Visitors include those covered and not covered by OSHA.

3 24-hour training is adequate for these workers only for entry into areas where Level D PPE is sufficient. For routine workers, the area must also have been monitored and fully characterized.

4 Supervisors of general site workers who require only the 24-hour course need only take the 24-hour initial and 8-hour supervisor courses.

Visitors who do not have the required OSHA training and medical certifications will not be allowed to enter the site EZ or CRZ. Prior to gaining access to the site, visitors to OU7 will have an orientation that summarizes the SSHSP. This orientation does not qualify the visitor to access-controlled areas of the site. The purpose of the briefing is to provide sufficient information on the hazards and control measures at the site to prevent the visitor from unknowingly violating any site control measures. Visitors will be escorted by a trained site employee during the entire visit.

Visitors will provide signature verification that they have read, understand, and will comply with the requirements of the SSHSP. Signatures are recorded in a logbook, which is maintained at the STOLLER project trailers by the SM/FOL.

10.1.4 Safety Meetings

Discussion at weekly meetings may include the following topics:

- Health and safety considerations and the required PPE for current operations;
- Any revisions to the OU7 SSHSP;
- Any new MSDS filed at the STOLLER project trailers;
- Documented or observed unsafe acts committed at the worksite, a clarification of the safety requirements violated, and methods to prevent future violations; and
- Approved changes to the SSHSP.

Workers are required to attend the weekly safety meetings and sign a roster (attendance sheet) that will be maintained by the HSO at the STOLLER project trailers. Meeting minutes will be documented and attached to the roster. The SM/FOL or HSO will review the meeting minutes with absentees and have them sign the attendance sheet. This documentation will be filed at the work site, available to EG&G upon request, and archived when the project is completed. Safety meetings will be conducted weekly at a minimum or more frequently as necessary.

10.1.5 Rehearsal of Emergency Response Plan

STOLLER personnel will participate in any Emergency Response Plan rehearsals conducted by EG&G Emergency Preparedness.

10.2 Implementation of Training

Training for STOLLER and STOLLER-subcontractor personnel is provided by the WALSH HSO and outside sources which include EG&G training courses. Only trained employees will be assigned to perform field work. Training must meet the performance requirements

of WALSH and OSHA. STOLLER and STOLLER-subcontractor personnel will be required to complete EG&G CBT modules, including GET and Radiation Safety for Environmental Restoration.

10.3 Verification of Training

The HSO will maintain documentation of STOLLER and STOLLER-subcontractor employee training (including supervised field experience) on file at the STOLLER project trailers. These records will be kept on file by the HSO.

11.0 EMERGENCY INFORMATION

11.1 Notification

LIFE-THREATENING EMERGENCIES
CALL EXTENSION 2911

NON LIFE-THREATENING EMERGENCIES
CALL EXTENSION 2914

Notification requirements for emergency situations at OU7 depend on the nature of the perceived emergency (e.g., spill injury, illness, fire) and the extent to which the damage and/or injuries have progressed. Upon discovery of a release of materials or other non life-threatening emergency situation, the Shift Superintendent will be notified at extension 2914. If there is no answer at 2914, refer to 2911. If the situation is life-threatening, RFP emergency response personnel will be notified as detailed below.

Call Extension 2911 to obtain emergency assistance for life-threatening emergencies and to simultaneously access the following:

- Emergency Coordinator (EC), Shift Superintendent
- Plant Protection Central Alarm Station
- Fire Department Dispatch Center
- Medical Department

As much detail about the emergency as possible will be provided. A decision to dispatch any or all of the following equipment will be based on the provided information:

- Fire Engine
- Ambulance
- Hazardous Material (HAZMAT) Response Vehicle

Provide the following information, upon request, to the Emergency Dispatcher:

- Informant's name
- Exact location of the emergency
- Nature of the emergency

- Condition of the patient if applicable (breathing, consciousness, bleeding, etc.)
- Special hazards in the area
- Any other information requested

If no details are given, emergency response personnel will respond automatically.

The EC will immediately respond to emergencies. The RFP Protection Central Alarm Station will activate the Building Emergency Support Team by the Life Support/Plant Warning Public Address System. The EC will activate the Emergency Operation Center and notify departments that have an advisory role in the situation, if applicable. The EC will determine whether additional help from off-site agencies (e.g., police, hospitals) is required.

The EC will also notify the following groups when appropriate: -

- Radiological Engineering
- Industrial Hygiene
- Industrial Safety
- Waste Operations
- Waste Programs
- Traffic
- Occurrence Notification Officer
- Health and Safety Administrator

11.2 Specific Site Hazards

The response to and abatement of most emergency situations at OU7 will require the expertise of RFP emergency response personnel. Situations that will require the assistance of RFP emergency responders include, but are not limited to the following:

- Accidents resulting in physical injury;
- Accidents resulting in chemical or radiological exposure;
- Incidents where the substance cannot be absorbed, neutralized or otherwise controlled at the time of release;
- Situations where there is a potential for safety or health hazards (i.e. fire, explosion, or chemical/radiological exposure, etc.);
- Accidents resulting in a radiological exposure exceeding the following limits:
  - 2 rem (whole body)
  - 7.5 rem (skin)
  - 15 rem (extremities); and
- Chemical exposures exceeding the TLV or PEL.

11.3 Fires and Explosions

IN THE EVENT OF A FIRE OR EXPLOSION, IMMEDIATELY CALL EXTENSION 2911

In the event of a fire or explosion, personnel will immediately evacuate the area. Evacuation will be a minimum of 300 feet upwind/crosswind of the emergency. The emergency will be handled by the Fire Department and their designees. Portable fire extinguishers are available for small, controllable incipient fires. Fires, regardless of size, are to be reported to the Fire Department.

11.4 Spills of Hazardous and Radioactive Mixed Waste and Hazardous Material

REPORT TO THE EC AT EXTENSION 2911 all spills where the substance cannot be absorbed, neutralized, or otherwise controlled at the time of release, or where there is a potential for safety or health hazards (fire, explosion, chemical, or radiological exposure). The EC will dispatch the HAZMAT Response Vehicle and any other necessary support personnel.

Spills that do not require a HAZMAT response shall be cleaned up by site personnel according to an approved EG&G SOP. Spills onto porous ground will require removal of contaminated dirt as well as the spilled material and are expected to be classified as hazardous and radioactive mixed waste.

11.5 Post-Emergency Response Equipment Maintenance

Equipment used in emergency situations will be decontaminated by wiping with a soap solution. Rags used for decontamination will be disposed as low-level radioactive waste, if necessary. Contaminated heavy equipment used in emergencies will be thoroughly decontaminated prior to being released from the site. The decontamination protocols described in SOPs FO.10 - Heavy Equipment Decontamination, FO.11 - Handling of Decontamination Water and Wash Water, and FO.18 - Decontamination Facility Operations will be followed. Equipment will not be released until monitoring indicates that contaminant levels are less than 20 disintegrations per minute/100 square centimeters (above background) and that chemical contamination is not present.

11.6 Emergency Equipment Location

A 15-minute emergency eye wash and shower will be provided for tasks where eye hazards may exist. Either a 15-minute eye wash will be located within 100 feet or 10 seconds of travel time from each hazard area or a portable hand-held eyewash bottle will be available at the site for use. These items may be located in the WALSH project trailers on the site. Fire extinguishers will be located in all field vehicles and will be temporarily located at sites where there is a potential for fires (e.g., during welding operations). First aid will be provided by EG&G Emergency Medical Technicians.

11.7 Evacuation Plan

Personnel and visitors to OU7 will evacuate the area if any of the following occur:

- If an emergency (such as a fire or chemical spill) develops
- If instructed by site supervision
- If instructed by the Shift Superintendent over the site radio or telephone system.

After an evacuation, each Field Team Leader will verify that the employees that he/she supervises are accounted for.

11.8 Communication

Telephones are available in the WALSH project trailers (966-6544 and 966-6545). In addition, radios will be used by field personnel to maintain contact with the SM/FOL or other designated persons in the trailers who have access to telephones. The HSO and SM/FOL will monitor the radio frequency in use by field personnel at all times during field operations. Radio frequencies are monitored by the RFP security system to ensure that response time is minimal in the event of an accident or emergency on the site. In the event of a plant emergency, Central Dispatch will notify the trailers and field personnel by telephone and radio. If Central Dispatch fails in its attempt to contact anyone on-site, a security car will be sent to the site to alert personnel of the emergency.

12.0 REFERENCES

EG&G. 1992a. Final Phase I RFI/RI Work Plan, Woman Creek Priority Drainage (Operable Unit No. 5), Revision 1, February.

EG&G. 1992b. Final Site-Specific Health and Safety Plan for the Phase I RCRA Facility Investigation/Remedial Investigation Operable Unit 5.

U.S. Department of Energy (DOE). 1991. Final Phase I RFI/RI Work Plan, Rocky Flats Plant, Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203 (Operable Unit No. 7). U.S. Department of Energy, Rocky Flats Plant, Golden, Colorado. Environmental Restoration Program. December 1991.

APPENDIX A

HEAT AND COLD STRESS

APPENDIX A

HEAT AND COLD STRESS

INTRODUCTION

When personnel work in hot environments, the safety officer and field workers should be trained to recognize heat stress symptoms and provide first aid treatment until more qualified personnel take over. Personnel trained in advanced first aid or emergency medical technicians (EMTs) assess the degree of heat stress using more factors than mentioned in this guidance.

The following information is of a practical nature for field personnel and is not intended to be a treatise for medical personnel. It is intended to minimize heat stress to field workers and to provide common symptoms/first aid treatment.

HEAT STRESS

Heat stress occurs when the rate of heat gain is greater than body's ability to remove it. It is therefore important to understand the factors which cause overheating and mechanisms to control those factors.

Heating of the body occurs from three sources:

- Radiant heating from heat sources or sunlight.
- Convective heating from contact with a warmer object or liquid.
- Metabolic heating caused by activity.

Cooling occurs through three mechanisms:

- Respiration: The air we exhale is warm. As the body overheats, respiration become more rapid.
- Radiation: Heat is released at the surface of the skin. As the body overheats, the surficial blood vessels dilate and allows more heat to be lost.
- Evaporation: Perspiration is released to the skin surface and evaporates. The skin is cooled by evaporative cooling.

HEAT STRESS SYMPTOMS AND TREATMENT

CONDITION	COMMON SYMPTOMS	TREATMENT
Slightly elevated body temperature	Temperature 100 to 101° F Headache	Drink cool fluids. Rest in cool place until temperature and pulse are below 100 and 110, respectively.
Heat rash	Rash mainly on back	Shower at the end of the shift.
Heat cramps	Muscle cramps or twitching often starting in abdominal area. Pain in hands, feet and abdominal areas.	Remove from field work. Take off PPE. Encourage consumption of cool fluids designed to replenish electrolytes (e.g. Gatorade). No field work for 24 to 48 hours.
Heat exhaustion *	Temperature between 99 and 102° F Elevated pulse Profuse sweating Pale skin Cool wet/clammy skin Lethargic Nausea Dizziness	Remove from field work. Take off PPE. Drink cool fluids. Rest in cool place. No field work for at least 48 hours.
Heat stroke *	Temperature greater than 102° F Hot, dry skin Flushed skin Light or no sweating Rapid pulse	**LIFE THREATENING** Remove PPE. Remove from field work. Flush with cool, not cold water. Drive to Hospital. Written release from doctor required to return to work.

* If in doubt about whether the condition is heat exhaustion or heat stroke, seek medical attention. Health care specialists have additional training to interpret pupillary response to light, blood pressure, and other factors.

EFFECTS OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

Heat stress may occur with or without use of PPE. PPE normally adds layers of clothing which insulate the wearer from cooling air. Chemical protective clothing generally has a vapor barrier to keep out chemical vapors. The vapor barrier also prevents evaporative cooling of perspiration. In short, PPE increases the heat stress on workers.

PRACTICAL METHODS TO REDUCE HEAT STRESS

- Become acclimatized to heat for several days whenever possible. Plan work in the cooler portions of the day. Early morning hours and evening hours are cooler.
- Do site preparations before the field team dresses out. Instrument calibrations, heat stress monitoring, sample jar labeling, etc., should be performed before dressing in chemical PPE.
- If chemical PPE has a vapor barrier, have personnel dress out in stages. Dress out half-way. When the team is all half-dressed, perform final heat stress monitoring, put them on air, and complete the dress-out.
- If supplied air operations are performed routinely in hot environments, the purchase of vortex coolers should be considered. Cool vests may also be used.
- Take frequent breaks and consume at least one pint of cool fluid every hour. Replenish electrolytes through the consumption of diluted drinks. The body loses more water than electrolytes. Concentrated salt, electrolyte, or juices can increase susceptibility to heat stress.

OCCUPATIONAL EXPOSURE STANDARDS

Heat Stress Monitoring

The U.S. Environmental Protection Agency (EPA) and the American Conference of Governmental Industrial Hygienists (ACGIH) have published heat stress monitoring recommendations. The EPA recommends heat-stress monitoring at temperatures above 60° F when chemical PPE is used.

ACGIH

The tabulated information assumes that no chemical PPE is being worn. Since chemical PPE tends to increase heat stress, ACGIH has published correction factors in the same standard. **OSHA enforces the ACGIH recommendation.**

Heat-stress prevention is stressed. ACGIH uses an adjusted temperature called a wet bulb globe temperature (WBGT) to derive work-rest cycles based upon:

- Radiant heat loads (sunlight),
- Evaporative heat loss (perspiration)
- Ambient temperature (temperature in the shade)
- Metabolic rate

The work/rest schedules depend upon the type of PPE used and the type of work being performed. ACGIH recommendations for three types of PPE are given on the next page. Preplanning is required to prevent undue pressure to work under conditions which exceed OSHA exposure standards.

The WBGT should be used to minimize potential for heat injuries. OSHA enforces the recommendations of the ACGIH. Although the OSHA method reduces potential for heat stress, it does not prevent heat stress. The WBGT criteria are intended to keep the deep body temperature below 38° C (100.4° F) and to prevent more serious symptoms of heat stress.

Monitoring of the deep body temperature helps to ensure that personnel do not get seriously injured from heat exposure. EPA guidance recommends that the deep body temperature (rectal or inner ear) not exceed 38° C (100.6° F), and that the heart rate (pulse) be kept below 110 beats per minute (after 5-minute rest).

Rectal temperature monitoring is impractical in a field setting and inner ear thermometers are very expensive. Oral temperatures can be used if the action limit is lowered by about one-half of a degree Fahrenheit (1/4 degree C). If monitoring and the corresponding documentation is not maintained, the immediate supervisor and the company take on unnecessary legal liability.

HEAT STRESS WORK/REST REGIMES

Heat Stress with compensation for **Cotton Coveralls** work clothing

TEMPERATURE

Work min/hr	Rest min/hr	Light Workload WBGT ° F	Moderate Workload WBGT ° F	Heavy Workload WBGT ° F
60	0	84	78	75
45	15	85	80	76
30	30	87	83	80
15	45	88	88	84

Heat Stress with compensation for **Plastic Coated Tyvek Coveralls** work clothing
Compensation -6° C, -10.8° F

TEMPERATURE

Work min/hr	Rest min/hr	Light Workload WBGT ° F	Moderate Workload WBGT ° F	Heavy Workload WBGT ° F
60	0	73.2	67.2	64.2
45	15	74.2	69.2	65.2
30	30	76.2	72.2	69.2
15	45	77.2	75.2	73.2

Heat Stress with compensation for **Plastic Coated Tyvek fully encapsulating suit** work clothing
Compensation -10° C, -18° F

TEMPERATURE

Work min/hr	Rest min/hr	Light Workload WBGT ° F	Moderate Workload WBGT ° F	Heavy Workload WBGT ° F
60	0	66	60	57
45	15	67	62	58
30	30	69	65	62
15	45	70	68	66

Based on ACGIH, 1990-1991 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices .

WALSH HEAT STRESS MONITORING

Heat Stress Monitoring will be performed whenever ambient temperatures exceed 80° F. Oral temperatures and pulse rates will be taken at the end of each break.	
ORAL TEMPERATURE (° F)	**ACTION**
98 to 99	Continue work
99 to 100	Reduce work load, increase fluid intake, increase rest breaks
Greater than 100	Remove from field, remove PPE, drink cool fluids, rest in cool area until temperature returns to 99
PULSE (HEART RATE)	**ACTION**
50 to 100	Continue working
100 to 109	Reduce work rate, drink cool fluids, take more rest breaks, monitor every 15 minutes
Greater than 110	Remove from field, remove PPE, rest in cool area, drink cool fluids, no field work until pulse below 100 beats per minute.

If the oral temperature exceeds 100 °F, or the pulse rate exceeds 110 beats per minute at rest, the person must not continue to work. These conditions have been found to prevent most heat related illnesses. Occasionally, high heat conditions combined with poor eating, sleeping and drinking habits has resulted in heat stroke occurring in less than 20 minutes. Continuous monitoring is therefore recommended whenever practical.

Heat stress monitoring must be performed at least once per hour for documentation, even when it is unlikely to affect the worker. As the temperature increases, the worker starts to show signs of heat stress and the monitoring frequency should be increased accordingly.

HEAT STRESS MONITORING FORM

Site: Date:

Name	Time	Weight (lbs)	Oral Temp	Blood Press.	PPE A,B C,D
	HSO Name:_____ HSO Signature:_____ Date: _____				

COLD STRESS

Personnel working outdoors in low temperatures, especially at or below freezing are subject to cold stress. Exposure to extreme cold for a short time causes severe injury to the surface of the body. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ears are the most susceptible.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature.

Frostbite

Local injury resulting from cold is included in the generic term frostbite. Frostbite of the extremities can be categorized into:

- "Frost nip or incipient frostbite" is characterized by sudden whitening of skin.
- "Superficial frostbite is characterized by skin with a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- "Deep frostbite" is characterized by tissues that are cold, pale, and solid.

Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95 degrees Fahrenheit.
- Unconsciousness, glassy stare, slow pulse, and respiratory rate.
- Freezing of the extremities.
- Death

Field activities shall be terminated by the site coordinator or HSO if initial signs of frostbite or hypothermia exist or if equivalent chill temperature is below zero degrees Fahrenheit. All affected personnel shall be kept warm and receive immediate medical care.

Additional notes to remember:

- Do not rub the frostbitten part (this may cause gangrene).
- Do not use ice, snow, gasoline or anything cold on the frostbitten area.
- Do not use heat lamps or hot water bottles to rewarm the part.
- Give a warm drink - not coffee, tea, or alcohol

APPENDIX B

FIELD ACTIVITIES FROM OPERABLE UNIT 7 PHASE I RFI/RI WORK PLAN

TABLE B-1
FIELD ACTIVITIES
PHASE I INVESTIGATION
IHSS 114 - PRESENT LANDFILL

Activity	Purpose	Location	Number of Samples
Review New Data	Evaluate/incorporate new data	NA	NA
Visual Inspection	Evaluate impacts of waste operators on field activities	Site	NA
Cone Penetrometer Testing	• Characterize lithologies • Determine extent of landfill • Determine volume of landfill • Determine depth to leachate/ground water	Within IHSS 114	38
In-Situ Sampling Gas/Leachate/Ground water	• Characterize landfill gas • Characterize leachate/groundwater	Within IHSS 114	38
Drill and Sample Borings	• Characterize lithologies • Characterize geologic material within, upgradient, and downgradient of IHSS 114 • Determine depth to water	Within and downgradient of IHSS 114	11
Pump-In Borehole Packer Tests	• Obtain hydraulic properties of bedrock	Within and downgradient of IHSS 114	8

TABLE B-1
FIELD ACTIVITIES
PHASE I INVESTIGATION
IHSS 114 - PRESENT LANDFILL
Continued

Activity	Purpose	Location	Number of Samples
Monitoring Well Installation/Sampling	• Obtain leachate/groundwater level data • Characterize groundwater quality within IHSS 114 • Characterize alluvial and bedrock groundwater quality upgradient of IHSS 114 • Determine if groundwater intercept system is functioning • Handling of drilling fluids, cuttings, purge/development water	Within IHSS 114	15

NA = Not Applicable

TABLE B-2
FIELD ACTIVITIES
PHASE I INVESTIGATION
IHSS 114 - EAST LANDFILL POND SPRAY EVAPORATION AREA

Activity	Purpose	Location	Number of Samples
Sediment Sampling of East Pond	• Characterize chemistry of pond sediments • Determine thickness of pond sediments	East Landfill Pond	3
Leachate/Surface Water Sampling	• Characterize chemistry of landfill leachate and pond water • Obtain discharge measurement from leachate seep	East Landfill Pond	2
Effluent Sampling From Ground-Water Diversion System Discharge	• Characterize chemistry of intercepted ground water • Obtain discharge flow rate	SW 099 SW 100	2
Location Survey	• Accurately determine sampled locations	All 62 sampled points	62
Areas Around East Landfill Pond			
Visual Inspection	• Delineate areas impacted by spray evaporation	Area around Landfill Pond	NA
Radiation Field Screening	• Identify areas of radionuclide contamination	Area around Landfill Pond	96

TABLE B-2
FIELD ACTIVITIES
PHASE I INVESTIGATION
IHSS 114 - EAST LANDFILL POND SPRAY EVAPORATION AREA
Continued

Activity	Purpose	Location	Number of Samples
Surficial Soil Sampling	• Characterize surficial soil contamination	50-foot grid around Landfill Pond; 100-foot grid downwind of Landfill Pond	122
Subsurface Soil Sampling (when analytical results of surficial soil sampling indicate concentrations above background)	• Characterize vertical extent of soil contamination	50-foot grid around Landfill Pond; 100-foot grid downwind of Landfill Pond	?
Location Survey	• Accurately determine sampled locations	All sample points	122

NA = Not Applicable

TABLE B-3
FIELD ACTIVITIES
PHASE I INVESTIGATION
IHSS 203 - INACTIVE HAZARDOUS WASTE STORAGE AREA

Activity	Purpose	Location	Number of Samples
Visual Inspection	• Identify areas that may have been impacted by spills	Within IHSS 203	NA
Soil-Gas	• Determine presence/absence of soil-gas at 10 to 12 inches depth	25-foot grid within IHSS 203	35
Surficial Soil Sampling	• Characterize surficial soil contamination	25-foot grid within IHSS 203	35
Subsurface Soil Sampling (when analytical results of surficial soil sampling indicate concentrations above background)	• Characterize vertical extent of soil contamination	25-foot grid within IHSS 203	35
Location Surveying	• Accurately determine sampled locations	All sampled points	35

NA = Not Applicable

APPENDIX C

PROPERTY RELEASE EVALUATION FORM FOR EQUIPMENT

FORM 3.2F

PROPERTY RELEASE EVALUATION

ITEM NUMBER _____

PART I (From Record of Property Leaving The RCA)

Description of Property to be Released _____

PART II

A. Property History _____

B. User/Sender: _____ _____ Date: _____
Signature Employee No. Extension: _____
Page No. _____

PART III

A. Radiological Engineering Evaluation _____

B. Survey/Sample Methods to be Used _____

C. Release Criteria _____

D. Evaluated By: _____ _____ Date: _____
Radiological Eng.: Signature Employee No. Extension: _____

APPENDIX D

RADIOLOGICAL DEFICIENCY REPORT
RADIATION WORK PERMIT

ROCKY FLATS
RADIOLOGICAL DEFICIENCY REPORT

RDR Number:
RAP Number:
Occurrence Reporting Number:

ORIGINATOR

DATE:
TIME:

LOCATION: (Indicate all applicable locations)
Building _____ Room _____ Building _____ Room _____
Building _____ Room _____ Building _____ Room _____
Pad _____ Pad _____ Pad _____ Other _____

INDIVIDUALS INVOLVED: [ ] Unknown

Name	Employee No.	Org/Company	Job/Classification	Supervisor

DESCRIPTION OF EVENT: (Check all that apply. If none apply, check "other" and explain)

[ ] General Area Contamination
[ ] Personnel Contamination (Skin)
[ ] Company Clothing Contamination
[ ] Personal Clothing Contamination
[ ] Contamination in Uncontrolled Area
[ ] Spill Contributing to Area Contamination
[ ] Loss of Radioactive Sources
[ ] Improperly Marked Radioactive Material
[ ] Improper or Lacking Radiological Posting
[ ] ALARA Concerns
[ ] Exceeding Exposure Limits
[ ] Exceeding Exposure Administrative Limit
[ ] Procedure Violation/Inadequacy
[ ] Rad Work Permit Violation/Inadequacy
[ ] Positive SAM Alarm w/o Respiratory Protection
[ ] Wound (confirmed positive)
[ ] Failure to Obtain/Adhere to Pre-evolution
[ ] Poor Housekeeping in Contrated Area
[ ] Misuse of Respiratory System
[ ] Radiological Posting Violation
[ ] Radiacmeter Lost/Not Worn
[ ] Improper Use of Radiological Containment
[ ] Improper Disposal of Rad Waste
[ ] Improper Wearing of Anti-C Clothing
[ ] Improper Printing of Personnel/Items
[ ] Potential/Confirmed Inhalation Ingestion
[ ] Loss of Containment/Control
[ ] Other _____

DESCRIPTION OF DEFICIENCY: INCLUDE DOCUMENTATION - RWPs, SURVEYS, AIR SAMPLES RESULTS, ETC.
ANSWER WHO, WHAT, WHEN, WHERE, WHY, AND HOW
(use additional pages as necessary)

IMMEDIATE CORRECTIVE ACTION:

ORIGINATOR: _____ DATE: _____
EMPLOYEE # _____ TIME: _____

REVIEWED: RAD OPS FOREMAN
DATE: _____ EMPLOYEE # _____
TIME: _____

DOE 5480.14, CATEGORIZATION: [ ] Emergency
[ ] Unusual Occurrence [ ] Off Normal
[ ] Internally Reportable
OPS Manager: (if applicable)
EMPLOYEE # _____ DATE: _____ TIME: _____

RWP

MANAGER RESPONSIBLE FOR CORRECTIVE ACTION: _____ TARGET DATE: _____

RADIOLOGICAL ENGINEERING KNOWLEDGE
NAME: _____ DATE: _____ TIME: _____

RESPONSIBLE MANAGER

ACTIONS TAKEN INCLUDING THOSE TO PREVENT RECURRENCE:
(use additional pages as necessary)

I HAVE CORRECTED THIS RDR AND RECOMMEND CLOSEOUT. DATE: _____

RESPONSIBLE MANAGER: _____ EMPLOYEE #: _____

RBE

STATUS: [ ] Satisfactory [ ] Unsatisfactory [ ] Redirected NOTES:

CONCURRENCE: _____ EMPLOYEE #: _____ DATE: _____

APPARENT CAUSE CATEGORY: [ ] Procedures [ ] Communications [ ] Equipment [ ] Training [ ] Personnel
[ ] Management Systems [ ] Planning [ ] Other _____

THIS RDR APPEARS TO HAVE BEEN ADEQUATELY ADDRESSED, REQUIRES NO FURTHER ACTION, AND IS CLOSED.

RBE MANAGER: _____ DATE: _____

RADIATION WORK PERMIT

☐ EXTENDED

Rocky Flats Plant

NO.:

Date:

Specific Task or Operation

WO/PROCEDURE #

Location: Bldg ____ Rm ____
Area:

Supervisor: Phone
Name:
Empl #
Department

RWP Starts
Date
Time

RWP Ends
Date
Time

REQUIREMENTS

Protective Clothing
- ____ Inspection Only
- ____ Coveralls
- ____ Shoe Covers
- ____ Surgeon Gloves ____ pair
- ____ Anti-C Coveralls
- ____ Wet Suit
- ____ Plastic Bootles
- ____ Rubber Boots
- ____ Hood ____ type
- ____ Work Gloves ____ type
- ____ Tape Openings
- ____ Other

Respiratory
- ____ Full Face, Particulate
- ____ Full Face, Airline
- ____ Supplied Air Suit
- ____ Portable SAAM
- ____ Lapel Air Sample

Containment
- ____ Pen
- ____ Tent
- ____ Point Source
- ____ Air Mover
- ____ HEPA Vacuum

ALARA REVIEW REQUIRED ____ Y ____ N

Dosimetry
- __XX__ TLD ____ SRD
- ____ EXT
- ____ Other
- ____ Pre/Post Bioassay

DO NOT EXCEED ____ mRem/RWP

Rad Ops Coverage
- ____ Full ____ Start
- ____ Oncall ____ None

Rad Eng ____ Y ____ N
Name:
Phone:

Comments

SURVEYS

Smear Type: A BG

Extended RWP
Freq: S D W M R O NA

Pre/Post/Dur

Removable							
Fixed							
mR/hr G							
mRem/hr N							
mRem/hr @ 1m							
N/G Ratio							
RPT Name							
Employee #							
Date							
Time							
RO Foreman Employee #							

Original – Post at work site (Return to RAD E
Copy – RWP Master File
Copy – Rad Building Engineer

APPENDIX E

DERIVED AIR CONCENTRATIONS (DACs) FOR CONTROLLING RADIATION EXPOSURE TO WORKERS AT DOE FACILITIES

APPENDIX E

DERIVED AIR CONCENTRATIONS (DACs) FOR CONTROLLING RADIATION EXPOSURE TO WORKERS AT DOE FACILITIES

The DAC for limiting radiation exposures through inhalation of radionuclides by workers are listed in Appendix E, Figure 1. The values are based on either a stochastic (committed effective dose equivalent) dose limit of 5 rem (0.05 Sievert (Sv)) or a nonstochastic (organ) dose limit of 50 rem (0.5 Sv) per year, whichever is more limiting. (*NOTE: the 15 rem (0.15 Sv) dose limit for the lens of the eye does not appear as a critical organ dose limit.*)

Table 1 contains five columns of information:

(1) radionuclide,
(2) inhaled air CAD for lung retention Class D (in microCuries per milliliter (μCi/ml)),
(3) inhaled air DAC for lung retention Class W (μCi/ml),
(4) inhaled air DAC for lung retention Class Y (μCi/ml), and
(5) an indication of whether or not the DAC for each class is controlled by stochastic (effective dose equivalent) or nonstochastic (tissue) dose.

The Classes D, W, and Y have been established by the International Commission on Radiological Protection (ICRP) to describe the clearance of inhaled radionuclides from the lung. This classification refers to the approximate length of retention in the pulmonary region. Thus, the range of half-time is less than 10 days for Class D (days), from 10 to 100 days for Class W (weeks), and greater than 100 days for Class Y (years). The DACs in Table 1 are listed by radionuclide, in order of increasing atomic mass, and are based on the assumption that the particle size distribution of the inhaled material is unknown. For this situation, the ICRP recommends that an assumed particle size distribution of 1 μm be used. For situations where the particle size distribution is known to differ significantly from 1 μm, appropriate corrections (as described in the Department of Energy (DOE) report *Internal Dose Conversion Factors for Calculation of Dose to the Public*)[1] can be made to both the estimated dose to workers and the DACs.

Alternative absorption factors and lung retention classes for specific compounds are listed by element in Table 2 for cross-referencing with the inhalation DACs in Table 1. The data shown in Figure 2 are listed by element in alphabetical order.

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[1] U.S. Department of Energy (DOE). 1988. *Internal Dose Conversion Factors for Calculation of Dose to the Public*. Washington, D.C.

The following assumptions and procedures are used in calculating these DAC values for inhalation by workers:

- The worker is assumed to inhale 2,400 cubic meters (m^3) of air during a 2,000-hour work year, as defined by the ICRP in its Publication No. 23.[2]
- The internal dose factors used in calculating the DAC values were taken from the report *Internal Dose Conversion Factors for Calculation of Dose to the Public.*[1] These factors are based on the metabolic data and dosimetry models recommended by the ICRP in its Publication No. 30.[3]

The air immersion DAC values shown in Table 3 are based on a stochastic limit of 4 rem (0.05 Sv) per year or a nonstochastic (organ) dose limit of 50 rem (0.5 Sv) per year. Figure 3 contains three columns of information:

(1) radionuclide,
(2) half-life in units of seconds (s), minutes (min), hours (h), days (d), or years (y), and
(3) air immersion DAC (μCi/ml).

The data in Table 3 are listed by radionuclide in order of increasing atomic mass. The air immersion Dacs were calculated for a continuous, nonshielded exposure via immersion in a semi-infinite atmospheric cloud. The dose conversion factors used to calculate the DAC values for air immersion were taken from the DOE report *External Dose-Rate Conversion Factors for Calculation of Dose to the Public.*[4] The DAC value for air immersion listed in Table 3 for a given radionuclide is determined either by a limit on annual effective dose equivalent, which provides a limit on stochastic radiation effects, or by a limit on annual dose equivalent to any organ, which provides a limit on nonstochastic radiation effects. For most of the radionuclides listed in Table 3, the DAC value is determined by the limit on annual effective dose equivalent. Thus, the few cases where the DAC value is determined by the limit on annual dose equivalent to skin are indicated in the figure by an appropriate footnote. Again, the DACs listed in Figure 3 account only for immersion in a semi-infinite

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[2] International Commission on Radiological Protection (ICRP). 1975. *ICRP Publication 23: Report of the Task Group on Reference Man.* Pergamon Press; New York, New York.

[3] International Commission on Radiological Protection (ICRP). 1979-1982. *ICRP Publication 30: Limits for Intakes of Radionuclides by Workers.* Parts 1 to 3 and Supplements 2 (3/4) through 8 (4). Pergamon Press; New York, New York.

[4] U.S. Department of Energy (DOE). 1988. *External Dose-Rate Conversion Factors for Calculation of Dose to the Public.* Washington, D.C.

cloud and do not account for inhalation or ingestion exposures. Three classes of radionuclides are included in the air immersion DACs given in Figure 3, as described below.

- **Class 1**. The first class of radionuclides includes selected noble gases and short-lived activation products that occur in gaseous form. For these radionuclides, inhalation doses are negligible compared to the external dose from immersion in an atmospheric cloud.
- **Class 2**. The second class of radionuclides includes those for which a DAC value for inhalation has been calculated (using the ICRP inhalation dose equivalent factors), but for which the DAC value for external exposure to a contaminated atmospheric cloud is more restrictive (i.e., results in a lower DAC value). These radionuclides generally have half-lives of a few hours or less, or are eliminated from the body following inhalation sufficiently rapidly to limit the inhalation dose.
- **Class 3**. The third class of radionuclides includes selected isotopes with relatively short half-lives that were not considered in ICRP Publication 30. These radionuclides typically have half-lives that are less than 10 minutes, do not occur as a decay product of a longer-lived radionuclide, or lack sufficient decay data to permit internal dose calculations. These radionuclides are also typified by a radioactive emission of highly intense, high-energy photons, and rapid removal from the body following inhalation.

The DAC values are given for individual radionuclides. For known mixtures of radionuclides, the sum of the radio of the observed concentration of a particular radionuclide and its corresponding DAC for all radionuclides in the mixture must not exceed 1.0.

Derived Air Concentrations (DAC) for Controlling Radiation Exposures to Workers at DOE Facilities

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ[1] (D / W / Y)
H-3 (Water)[2]	2.E-05	2.E-05	2.E-05	St/St/St
H-3 (Elemental)[2]	5.E-01	5.E-01	5.E-01	St/St/St
Sr-80	5.E-06	-	5.E-06	St/ /St
Sr-81	3.E-05	-	3.E-05	St/ /St
Sr-83	3.E-06	-	2.E-06	St/ /St
Sr-85m	3.E-04	-	3.E-04	St/ /St
Sr-85	1.E-06	-	7.E-07	St/ /St
Sr-87m	5.E-05	-	6.E-05	St/ /St
Sr-89	3.E-07	-	6.E-08	St/ /St
Sr-90	8.E-09	-	2.E-09	BS/ /St
Sr-91	2.E-06	-	1.E-06	St/ /St
Sr-92	4.E-06	-	3.E-06	St/ /St
Cs-125	6.E-05	-	-	St/ /
Cs-127	4.E-05	-	-	St/ /
Cs-129	1.E-05	-	-	St/ /
Cs-130	8.E-05	-	-	St/ /
Cs-131	1.E-05	-	-	St/ /
Cs-132	2.E-06	-	-	St/ /
Cs-134m	6.E-05	-	-	St/ /
CS-134	4.E-08	-	-	St/ /
Cs-135m	8.E-05	-	-	St/ /
Cs-135	5.E-07	-	-	St/ /
Cs-136	3.E-07	-	-	St/ /
Cs-137	7.E-08	-	-	St/ /
Cs-138	2.E-05	-	-	St/ /
Am-237	-	1.E-04[5]	-	/St/
Am-238	-	1.E-06[5]	-	/BS/
Am-239	-	5.E-06[5]	-	/St/
Am-240	-	1.E-06[5]	-	/St/
Am-241	-	2.E-12[5]	-	/BS/
Am-242m	-	2.E-12[5]	-	/BS/
Am-242	-	3.E-08[5]	-	/BS/
Am-243	-	2.E-12[5]	-	/BS/
Am-244m	-	2.E-06[5]	-	/BS/
Am-244	-	7.E-08[5]	-	/BS/
Am-245	-	3.E-05[5]	-	/St/
Am-246m	-	7.E-05[5]	-	/St/
Am-246	-	4.E-05[5]	-	/St/
Pu-240	-	2.E-12[5]	6.E-12[5]	/BS/BS
Pu-241	-	1.E-10[5]	3.E-10[5]	/BS/BS
Pu-242	-	2.E-12[5]	6.E-12[5]	/BS/BS
Pu-243	-	1.E-05[5]	1.E-05[5]	/St/St
Pu-244	-	2.E-12[5]	6.E-12[5]	/BS/BS
Pu-245	-	2.E-06[5]	2.E-06[5]	/St/St

Radionuclide	Inhaled Air - Lung Retention Class D (µCi/mL)	W (µCi/mL)	Y (µCi/mL)	Stochastic or Organ1/ (D / W / Y)
Pu-234	-	9.E-08[5]/	8.E-08[5]/	/St/St
Pu-235	-	1.E-03[5]/	1.E-03[5]/	/St/St
Pu-236	-	7.E-12[5]/	1.E-11[5]/	/BS/St
Pu-237	-	1.E-06[5]/	1.E-06[5]/	/St/St
Pu-238	-	3.E-12[5]/	7.E-12[5]/	/BS/BS
Pu-239	-	2.E-12[5]/	6.E-12[5]/	/BS/BS
U-230	2.E-10	1.E-10	1.E-10	BS/St/St
U-231	3.E-06	2.E-06	2.E-06	St/St/St
U-232	9.E-11	2.E-10	3.E-12	BS/St/St
U-233	5.E-10	3.E-10	2.E-11	BS/St/St
U-234	5.E-10	3.E-10	2.E-11	BS/St/St
U-235	6.E-10	3.E-10	2.E-11	BS/St/St
U-236	6.E-10	3.E-10	2.E-11	BS/St/St
U-237	1.E-06	7.E-07	6.E-07	St/St/St
U-238	6.E-10	3.E-10	2.E-11	BS/St/St
U-239	8.E-05	7.E-05	6.E-05	St/St/St
U-240	2.E-06	1.E-06	1.E-06	St/St/St

1/ A determination of whether the DACs are controlled by stochastic (St) or nonstochastic (organ) dose, or if they both give the same result (E) for each lung retention class is given in this column. The key to the organ notation for nonstochastic dose is: BS = Bone surface, K = Kidney, L = Liver, SW = Stomach wall, and T = Thyroid. A blank indicates that no calculations are performed for the lung retention class shown.

2/ The ICRP identifies tritiated water and carbon as having immediate uptake and distribution; therefore no solubility classes are designated. For purposes of this table, the DAC values are shown as being constant, independent of solubility class. For tritiated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 30: Limits for Intakes of Radionuclides by Workers. For elemental tritium, the DAC values are based solely on consideration of the dose-equivalent rate to the tissues of the lung from inhaled tritium gas contained within the lung, without absorption in the tissues.

3/ A dash indicates no values given for this data category.

4/ These values are appropriate for protection from radon combined with its short-lived daughters and are based on information given in ICRP Publication 32: Limits for Inhalation of Radon Daughters by Workers and Federal Guidance Report No. 11: Limiting Values of Radionuclide Intake and Air Concentrations, and Dose Conversion Factors for Inhalation, Submersion, and Ingestion (EPA 520/1-88-020). The values given are for 100% equilibrium concentration conditions of the radon daughters with the parent. To allow for an actual measured equilibrium concentration or a demonstrated equilibrium concentration, the values given in this table should be multiplied by the ratio (100%/actual %) or (100%/demonstrated %), respectively. Alternatively, the DAC values for Rn-220 and Rn-222 may be replaced by 1 WL* and 1/3 WL,* respectively, for appropriate limiting of daughter concentrations. Because of the dosimetric considerations for radon, no f_1 or lung clearance values are listed.

* A "Working Level" (WL) is any combination of short-lived radon daughters, in one liter of air without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3 E+05 MeV of alpha energy.

5/ For the calculations, f_1 values were obtained from ICRP Publication 48: The Metabolism of Plutonium and Related Elements. It is assumed that the effective dose equivalents for inhalation are unchanged even though the f_1 values have changed. This is because the contribution to organ dose from inhalation is dependent mainly on transfer from lung to blood when f_1 values are small. Also, the gastrointestinal tract dose would be unchanged because the fraction of activity passing through the tract is $(1.0 - f_1)$.

Table 2

Alternative Absorption Factors and Lung Retention Classes for Specific Compounds

Element/ Symbol	Atomic Number	Compound	f_1	Lung Retention Class
Americium/ Am	95	All forms	1.E-03	W
Cesium/ Cs	55	All forms	1.E+00	D
Plutonium/ Pu	94	Oxides, hydroxides	1.E-05	Y
		Nitrates	1.E-04	W
		All other	1.E-03	W
		[Note: Use same values for ingestion]		
Strontium/ Sr	38	$SrTiO_3$	1.E-02	Y
		All others (soluble)	3.E-01	D
Uranium/ U	92	UO_2, U_3O_8	2.E-03	Y
		UO_3, tetravalent compounds	5.E-02	W
		UF_6, uranyl compounds	5.E-02	D

1/ A dash indicates no data for the value shown.
2/ For ingestion, no lung retention classes are listed.

Table 3

Derived Air Concentrations (DAC) for Workers from External Exposure During Immersion in a Contaminated Atmospheric Cloud

Radionuclide	Half-Life	Air Immersion DAC (μCi/mL)
Sr-85m[1/]	67.66 min	2.E-05
Sr-87m[1/]	2.805 h	6.E-05
Sr-92[1/]	2.71 h	3.E-06
Sr-93[2/]	7.3 min	2.E-06
Cs-126[2/]	1.64 min	4.E-06
Cs-129[1/]	32.06 h	1.E-05[6/]
Cs-138[1/]	32.2 min	2.E-06
Cs-139[2/]	9.40 min	1.E-05
U-239[1/]	23.40 min	8.E-05[6/]

1/ Committed effective dose equivalent from inhalation is calculated in ICRP Publication 30, but the DAC value for external exposure to a contaminated atmospheric cloud is more restrictive than the DAC value for inhalation.

2/ Committed effective dose equivalent from inhalation is not calculated in ICRP Publication 30, but DAC value for external exposure to contaminated cloud should be more restrictive than DAC value for inhalation due to relatively short half-life of radionuclide.

3/ DAC value is determined by limit on annual dose equivalent to skin, rather than limit on annual effective dose equivalent.

4/ DAC value applies to radionuclide in vapor form only; DAC value for inhalation is more restrictive for radionuclide in inorganic form.

5/ DAC value applies to radionuclide in inorganic or vapor form.

6/ DAC value for exposure to contaminated atmospheric cloud is the same as DAC value for inhalation. See footnote 4/ to Table 1 on page 24 of Attachment 1.

OU 7

Northwest Access Road

122

3rd Street

Cactus Avenue

West Road

EXPLANATION

- Route from OU 7 to Building 122
- Ditch
- Intermittent Stream
- Dirt Road
- Paved Road
- OU 7 IHSS Boundary
- OU 6 IHSS Boundary
- East Landfill Pond

N

0 feet 650 1300

EG&G ROCKY FLATS

Rocky Flats Site, Golden, Colorado

Route from OU 7 to Building 122, Rocky Flats Medical Building

Health and Safety Plan Addendum

Operable Unit No. 7

Date: July 1994

Figure 3

07/05/94 OU7SAFETY.MAP